UNCLASSIFIED

AD NUMBER

AD400304

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; 27 MAR 1963. Other requests shall be referred to Air Force Rome Air Development Center, Griffiss AFB, NY.

AUTHORITY

RADC ltr 26 Jul 1963, ASTIA TAB no. U63-4-2, 15 Oct 1963

THIS PAGE IS UNCLASSIFIED

UNCLASSIFIED

AD 400304

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA

LIMITATION REMOVED

PER AUTHORITY LISTED IN
ASTIA TAB NO. U63-4-2
DATE 15 OCT. 63

UNCLASSIFIED

RADC-TDR-62-512

SPECTRUM SIGNATURE
OF
RADAR SET AN/FPS-8

Serial Number 3

TECHNICAL DOCUMENTARY REPORT No. RADC-TDR-62-512

27 March 1963

Prepared for:

ELECTROMAGNETIC VULNERABILITY LABORATORY
ROME AIR DEVELOPMENT CENTER
RESEARCH AND TECHNOLOGY DIVISION
Air Force Systems Command
United States Air Force
Griffiss Air Force Base, New York

Project No. 4557
Task No. 455701

Prepared Under Contract
No. AF30(602)-2536
Order No. 3
Bendix Field Engineering Corporation
Owings Mills, Maryland

Dissemination Notice

Dissemination outside the Department of Defense is prohibited without prior approval of RADC (RAUMM-3).

Availability Notice

Qualified requesters may obtain copies from ASTIA. Orders will be expedited if placed through the librarian or other person designated to request documents from ASTIA.

Legal Notice

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related government procurement operation, the government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Disposition Notice

If this copy is not needed, return to RADC (RAUMM-3).

RADC-TDR-62-512

SPECTRUM SIGNATURE
of
RADAR SET
AN/FPS-8

Serial Number 3

TECHNICAL DOCUMENTARY REPORT NO. RADC-TDR-62-512
27 MARCH 1963

Prepared for

Electromagnetic Vulnerability Laboratory
Rome Air Development Center
Air Force Systems Command
United States Air Force
Griffiss Air Force Base
New York

Project No. 4557
Task No. 455701

Prepared Under Contract
No. AF30(602)-2536
Order No. 3
Task Number 77314-05
Bendix Field Engineering Corporation
Owings Mills, Maryland

Dissemination Notice

Dissemination outside the Department of Defense is prohibited without prior approval of RADC (RAUMM-3).

Availability Notice

Qualified requesters may obtain copies from ASTIA. Orders will be expedited if placed through the librarian or other person designated to request documents from ASTIA.

Legal Notice

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related government procurement operation, the government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Disposition Notice

If this copy is not needed, return to RADC (RAUMM-3).

FOREWORD

This report was prepared at Bendix Field Engineering Corporation - Facility Services from data collected by the Bendix RFI team under Contract Number AF30(602)-2536 and was assigned Bendix Task Number 77314-05.

ABSTRACT

~~This report is composed of three basic sections,~~ the collection of Radio Frequency Interference data for the transmitter, receiver and antenna sections of Radar Set AN/FPS-8, *is reported.*
The transmitter section is composed of the results of five basic tests, the receiver section is composed of the results of ten basic tests and the antenna section is composed of azimuth patterns of the horizontal and vertical planes of radiation gathered at the Test Facility at Verona, New York. The patterns include the fundamental and harmonic frequencies. This report is to be used as an input to the DOD Analysis Center Spectrum Signatures Library. The task outlined in this report *was* ~~has been~~ performed and the data submitted in accordance with the requirements outlined in the Military Collection Plan for Spectrum Signatures (revised 1 September 1961).
~~All paragraph headings and numbering sequence in this report correspond with the Military Collection Plan for Spectrum Signatures (revised 1 September 1961).~~

Cont'd on p. 1-1.

PUBLICATION REVIEW

This report has been reviewed and is approved.

Virgil D. Kempton

Approved: VIRGIL D. KEMPTON
1st Lt., USAF
Task Engineer

Samuel D. Zaccari

Approved: SAMUEL D. ZACCARI, Chief
Electromagnetic Vulnerability Lab
Directorate of Communications

TABLE OF CONTENTS

Para.		Page
	Part I General Test Information	
1.0	Scope	1-1
1.2	Definitions	1-1
2.0	General Requirements	1-1
2.10.1	General Data	1-2
2.10.2	General System Information	1-6
2.10.3	Specific Transmitter Information	1-7
2.10.4	Specific Receiver Information	1-7
2.10.5	Specific Antenna Information	1-8
	Part II Transmitter Measurements	
3.2.2	Power Output	2-4
3.2.3	Spurious Emission	2-6
3.2.4	Emission Spectrum	2-13
3.2.5	Modulation Characteristics	2-30
3.2.6	Intermodulation	2-51
3.2.7	Modulator Bandwidth	2-51
3.2.8	Carrier Frequency Stability	2-52
	Part III Receiver Measurements	
3.3.4	Sensitivity	3-2
3.3.5	Selectivity	3-4
3.3.6	Spurious Response	3-57
3.3.7	Overall Susceptibility	3-63
3.3.8	Intermodulation	3-69
3.3.9	Adjacent Signal Interference	3-72
3.3.10	Pulse Desensitization	3-85
3.3.11	CW Desensitization	3-88
3.3.12	Dynamic Range	3-91
3.3.13	Oscillator Radiation	3-96
	Part IV Antenna Measurements	
3.4	Antenna Measurements	4-1

LIST OF ILLUSTRATIONS

Figure No.		Page
	Part I - General Test Information	
2-1A	Topographical Data	1-9
2-1	Topographical Data	1-10
2-2	Site #1 Antenna Pattern	1-11
2-3	Site #2 Antenna Pattern	1-12
2-4	Site #3 Antenna Pattern	1-13
2-5	Detailed System Block Diagram	1-14
	Part II - Transmitter Measurements	
3.2.1	Diagram of Equipment Setup for Transmitter Measurements	2-1
3.2.2	Power Output and Carrier Stability Test Setup	2-2
3.2.4.1	Emission Spectrum	2-23
	Part III - Receiver Measurements	
3.3.4	Sensitivity Test Setup	3-3
3.3.5.1	Selectivity Curves	3-20
3.3.5	Selectivity Test Block Diagram	3-56
3.3.6	Spurious Response Test Block Diagram	3-60
3.3.6.A	Coax-to-Waveguide Adapter Calibration Curve	3-61
3.3.6.B	Coax-to-Waveguide Adapter Calibration Test Block Diagram	3-62
3.3.7.1	Site for Overall Susceptibility	3-67
3.3.7.2	Overall Susceptibility Test Block Diagram	3-68
3.3.8	Intermodulation Test Block Diagram	3-71
3.3.9.1	Adjacent Signal Interference Curves	3-76
3.3.9	Adjacent Signal Interference Block Diagram	3-84
3.3.10	Pulse Desensitization Test Setup	3-87
3.3.11	CW Desensitization Test Setup	3-90
3.3.12	Dynamic Range Test Setup	3-95
3.3.13	Oscillator Radiation Test Setup	3-98
	Part IV - Antenna Measurements	
3.4.1	Antenna Patterns	4-32

PART I

General Test Information

Cont'd from p. iii

1. Scope

1.1 The data collected and presented in this report will comprise one of the principal aids for (1) predicting the performance of the Radar Set AN/FPS-8 in an electromagnetic environment and (2) predicting the effect of this equipment on the electromagnetic environment of other equipments or systems.

1.2 All definitions used in this report are as per Military Collection Plan for Spectrum Signatures, Revised 1 September 1961 and MIL STD-449A.

2. General Requirements

2.1 Measurement Setup All equipment measured was in the closest approximation of the intended operating electrical conditions and physical configuration.

2.2 Primary Power-Supply Voltages The normal site commercial power source was used for the primary power of the equipment under test.

2.3 Interference-Free Measurement Area All measurements were performed in areas under conditions that would not adversely affect the measurement results.

2.4 Preparation of Equipment The equipment was determined to be in normal operating condition before its measurements were started.

2.5 Modulation The modulation used is specified in the individual measurement procedures.

2.6 Physical distinction between Receiver, Transmitter and Antenna This distinction is shown in Figure 2-5.

2.7 Equipment Termination All equipment terminations are those that apply to the particular equipment under test.

2.8 Measurement Equipment All measured quantities in this report were obtained using (1) laboratory-type signal generators, (2) calibrated attenuators and (3) calibrated frequency counters or meters.

2.9 Other Measurement Variables Variation of measurement procedures, other than specified in Military Collection Plan for Spectrum Signature, Revised 1 September 1961, are fully outlined in the following sections.

2.10.1 General Data

2.10.1.1 Test Equipment Used

MANUFACTURER	TYPE NUMBER	CALIBRATION DATE	SERIAL NUMBER
Tektronix	Oscilloscope Type 551		002825
Tektronix	Oscilloscope Type 545	11/16/61	10469
Empire Devices	FIM NF105		14958
Empire Devices	FIM NF112	3/14/62	14961
Empire Devices	T1	3/14/62	
Empire Devices	T2	3/14/62	14960
Empire Devices	T3	3/14/62	14959
Empire Devices	T4	3/14/62	14962
Polarad	Monitor Unit FIM Model B	3/22/62	210
Polarad	Tuning Unit FIM-L	3/20/62	163
Polarad	Tuning Unit FIM-S	3/16/62	169
Polarad	Tuning Unit FIM-M	3/20/62	163
Polarad	Tuning Unit FIM-X	3/20/62	170
Polarad	Power Unit FIM-P	3/22/62	204
Polarad	Reflector Model CA-R		202
Polarad	Broadband Antenna Model CA-B		173
Polarad	Microwave Test Antenna Model CA-L		290
Polarad	Microwave Test Antenna Model UH-1		104
Polarad	Antenna Horn Model CA-X		
Stoddard	FIM NM/30A		248-32
Stoddard	FIM NM/20B	3/28/62	251-29
FXR	Frequency Meter N414A	3/29/62	199
FXR	Frequency Meter N410A	3/21/62	1167
Polytechnic	Frequency Meter FR-49 (XW-3)/U		

2.10.1.1 Test Equipment Used -(Continued)

MANUFACTURER	TYPE NUMBER	CALIBRATION DATE	SERIAL NUMBER
Empire Devices	Coax Attenuator AT-160-3	3/20/62	------
Empire Devices	Coax Attenuator AT-160-6	3/20/62	------
Empire Devices	Coax Attenuator AT-160-10	3/20/62	------
Empire Devices	Coax Attenuator AT-160-20	3/20/62	------
Empire Devices	Coax Attenuator AT-160-40	3/20/62	------
Polarad	Signal Generator MSG-1	3/16/62	516
Polarad	Signal Generator MSG-2A	3/20/62	437
Polarad	Signal Generator MSG-34	3/16/62	
Hewlett-Packard	Signal Generator 612-A	3/13/62	14869
Hewlett-Packard	Signal Generator 614A	3/21/62	9024
Measurement Corp.	Signal Generator 65-B	11/15/61	1050
----------------	Signal Generator TS-419/U	11/1/61	458
----------------	Signal Generator TS-419/U	11/1/61	924
----------------	Signal Generator TS-403A/U	11/1/61	170
Hewlett-Packard	Signal Generator 608-A	3/15/62	1063
----------------	Signal Generator TS-403A/U	11/1/61	163
----------------	Signal Generator TS-612/U	11/1/61	7116
----------------	Signal Generator TS-622/U	11/1/61	332
Polarad	B P Filter Model F 6300-11,000 mc	checked 3/62	111
Polarad	B P Filter Model F 2050-3650 mc	checked 3/62	110
Polarad	B P Filter Model F 3550-6900 mc	checked 3/62	114
Polarad	B P Filter Model F 1180-2120 mc	checked 3/62	111
Sandborn	Recorder Model 322	12/27/61	14843
Polarad	Spectrum Analyzer SA-84	3/28/62	202-210
Polarad	Power Meter P-3		227

2.10.1.1 Test Equipment Used - (Continued)

MANUFACTURER	TYPE NUMBER	CALIBRATION DATE	SERIAL NUMBER
RCA	VTVM WV98A	11/61	59408
Polytechnic	Type 587-A	4/6/62	755
Hewlett-Packard	Frequency Counter HP-524B	3/25/62	------
Hewlett-Packard	Transfer Oscillator HP-540A	3/25/62	------
Rutherford	Pulse Generator B7B	3/22/62	148335

2.10.1.2 Topographical Location

2.10.1.2.1 General Figure 2-1 shows the topographical data of the radar set under test. The radar set was located at the Verona, New York, RADC Engineering Test Facility.

2.10.1.2.2 Specific Obstruction, interference sources, reference to geographical markers and charts are shown on Figure 2-1. All bearings to such existing conditions above are relative to true north.

2.10.1.2.3 Topographical Environmental Data The temperature range during the test was 5 to 10 degrees above zero. The flat terrain of loamy soil was frozen and covered with two feet of snow.

2.10.1.2.4 Electromagnetic Environmental Data The tests were conducted during the hours of 12 o'clock midnight and 8 a. m. During these hours, the general electromagnetic environment was at a minimum level. The other electronic equipment within the test site was not in operation. The normal detectable levels of television and radio stations were present during the testing. A low level of L-Band interference was detected and was originating at Watertown, New York. This interference did not affect the antenna pattern measurements due to the fact that the test on the FPS-8 was run -60db down with the back of the antenna towards the point of interference origin.

2.10.1.3 Measurement Location

2.10.1.3.1 General Three test sites shown in drawing of Figure 2-1 were used. Antenna patterns were taken at each of these sites to determine the site that gave the minimum amount of distortion and reflections. These patterns are shown in Figures 2-2, 2-3 and 2-4. Number 2 test site was chosen as the site for the antenna patterns and "far field" transmitter and receiver measurements.

2.10.1.5 Equipment Failures During the Measurement Program

2.10.1.5.1 Test Equipment Failures

a. Signal Generator TS-419/U- Pulse width control was not operating properly. Signal Generator was recalibrated and returned to operation. No test data affected by this failure.

b. Signal Generator Polarad MSG-1- Low power output caused by a defective RF voltage probe. The probe was replaced and the signal generator recalibrated. No test data affected by this failure.

c. Low sensitivity on the "L" Band tuning head of the Polarad FIM. Antenna patterns had to be repeated and the FIM calibrated.

d. The Oscilloscope, Tektronix type 551, lost its trace. Trouble was found to be in the power supply. No test data affected by this failure.

e. The "M" Band tuning head of the Polarad FIM was found to have a defective klystron tube. The klystron was replaced and the "M" tuning head recalibrated. No test data affected by this failure.

f. The oscilloscope camera trigger cable and the retaining ring broke. The camera trigger cable was replaced and the retaining ring repaired. No test data affected by this failure.

2.10.1.5.2 Radar Equipment Failures

a. A defective crystal in the RF amplifier was located and replaced.

b. Sensitivity of the MTI Receiver was below T.O. specifications. The MTI Receiver Group was replaced before any measurements were taken.

c. Receiver crystal mounting troubles resulted in low sensitivity. The trouble was corrected and the receiver sensitivity was rechecked according to T.O. procedures.

d. The modulator tube was found to be defective and was replaced.

e. Replaced reverse current diode in the modulator group.

f. No test data was affected by the above failures.

2.10.2 General System Information

2.10.2.1 Equipment The equipment under test was Radar Set AN/FPS-8, system serial number 3 located at RADC Test Facility, Verona, New York.

2.10.2.2 Bands The frequency of the Radar Set AN/FPS-8 is 1280 mc, to 1350 mc and is designated as L band radar.

2.10.2.3 Month and Year of Measurement The tests were started in February 1962 and completed in May 1962.

2.10.2.4 Source and Observer The testing observations and data gathering tasks were performed by Bendix Field Engineering, Facilities Services Department, RFI Engineering.

2.10.2.5 Plane of Reference The radar system directional coupler was used as a plane of reference. Figure 2-5 is a detailed block diagram showing the relationship of the plane of reference to the radar set and all significant test points and controls. The duplexer is considered to be part of both transmitter and receiver.

2.10.3 Specific Transmitter Information

2.10.3.1 Function The Radar Set AN/FPS-8 is a long range, air surveillance ground radar set.

2.10.3.2 Other Operational Characteristics The radar set uses a tunable magnetron for the transmitting tube which operates in the L Band frequency range (1280 to 1350 mc).

2.10.3.3 Emission Type and Bandwidth The Radar Set AN/FPS-8 is designated as 4000 PO emission type.

2.10.3.4 Pulse Repetition Rate The Radar Set AN/FPS-8 has a fixed pulse repetition rate of 360 pulses per second.

2.10.3.5 Pulse Width The nominal pulse width of the AN/FPS-8 is three (3) microseconds.

2.10.3.6 Power The nominal power output is one (1) megawatt peak and average power output is 1080 watts. The duty cycle is 0.00108.

2.10.4 Specific Receiver Information

2.10.4.1 Function The Radar Set AN/FPS-8 uses two receivers, a receiver (NORMAL) for normal video and a receiver for cancelled video (MTI).

2.10.4.2 Other Operational Characteristics Both receivers operate on a thirty (30) megacycle input from a common crystal mixer, R. F. Amplifier (L Band) and stalo.

2.10.4.3 Types of Signal Designed to Receive Both the NORMAL and MTI receivers are designed to receive three (3) microsecond pulse type signals.

2.10.4.4 Type Receiver The NORMAL and MTI receivers of the AN/FPS-8 are high gain, super-heterodyne, which receive radio frequency signals in the 1280 to 1350 megacycle band with a common front end.

2.10.4.5 Nominal Sensitivity The NORMAL receiver has a nominal sensitivity of -106 dbm. The MTI receiver has a nominal sensitivity of -102 dbm.

2.10.4.6 Nominal Receiver Bandwidth The NORMAL receiver has an IF bandwidth at the 3 db points of 600 KC $\pm$ 100 KC. The MTI receiver has an IF bandwidth at the 3 db points of 1 mc minimum. The RF Amplifier (Pre-Amp) has a bandwidth of 1.6 $\pm$ .2 mc.

2.10.4.7 IF Frequencies Both NORMAL and MTI receivers have an IF frequency of 30 megacycles.

2.10.4.8 Local Oscillator Frequency The local oscillator operates in the frequency range of 1310 to 1380 megacycles. The stalo is tuned 30 megacycles above the received frequency.

2.10.5 Specific Antenna Information

2.10.5.1 Polarization The AN/FPS-8 antenna has horizontal polarization.

2.10.5.2 Nominal Gain The nominal gain of the AN/FPS-8 antenna is 35.5 db over an isotropic dipole.

2.10.5.3 Scan Characteristics The AN/FPS-8 antenna under test was located on a temperate tower. The antenna has a rotation speed of 0 to 10 rpm CW or CCW, it covers 360° in azimuth or has sector scanning 40° to 120° in width. The focal point of the FPS-8 and the test antenna was 35 feet in height from ground level.

2.10.5.4 Number of Beams and Description The antenna of the AN/FPS-8 Radar Set has one cosecant squared beam, with a horizontal beam width of 2.5 degrees and a vertical beam width of 9 degrees, both measured at the 3 db points of the antenna pattern.

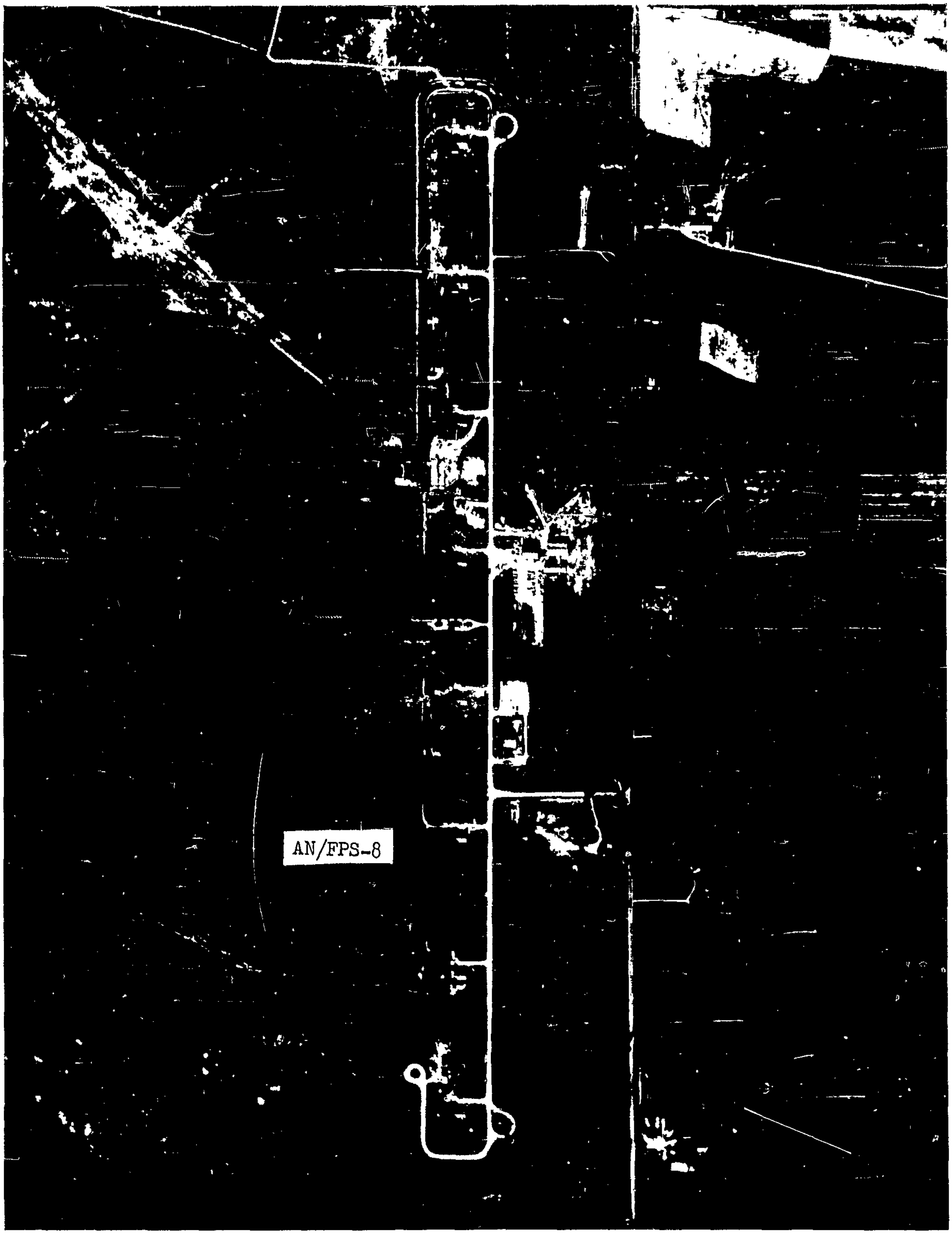
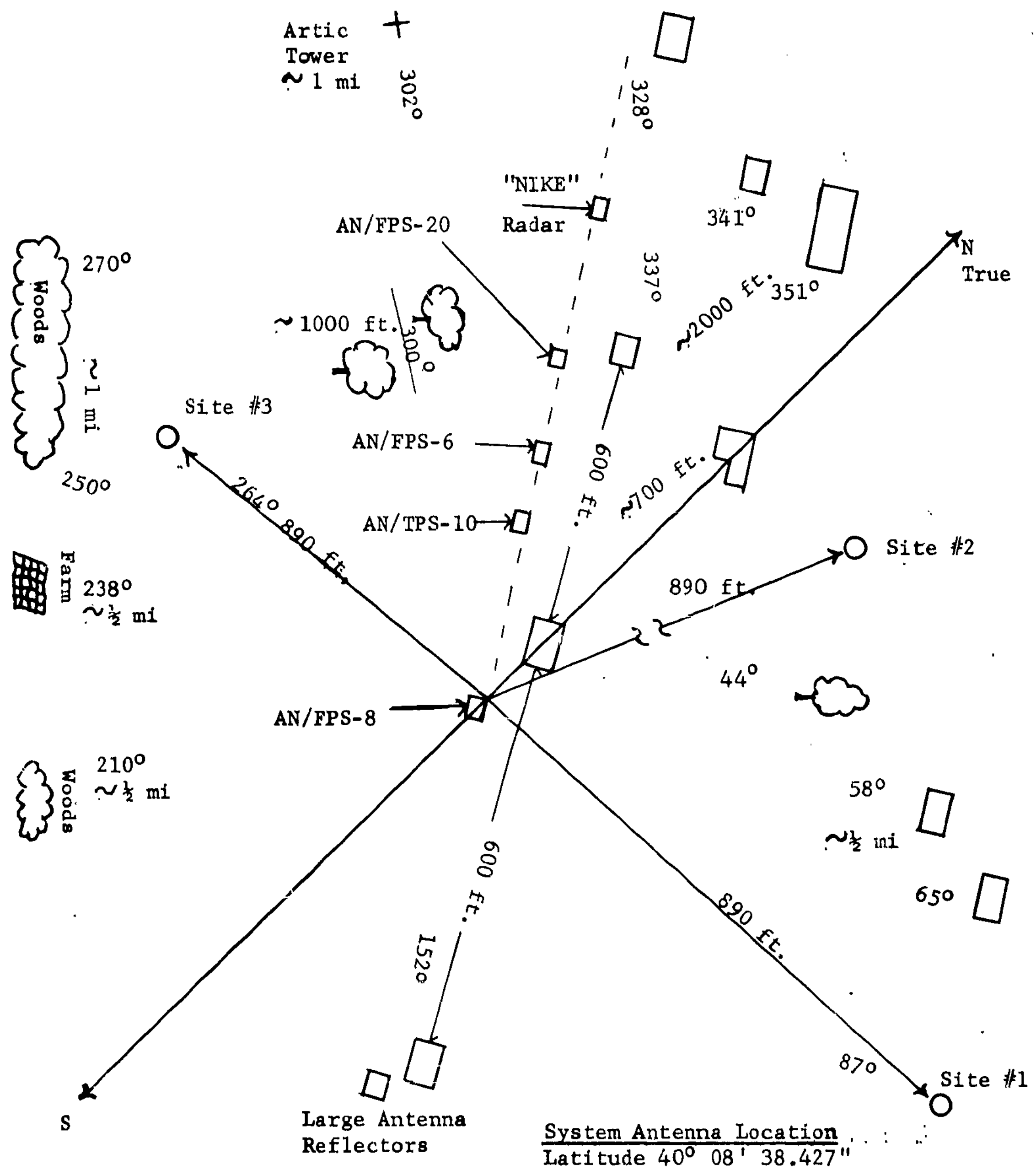


Figure 2-1A   Topographical Data



<u>System Antenna Location</u>
Latitude 40° 08' 38.427"
Longitude 75° 36' 39.142"

<u>Topographical Map Reference</u>
Verona Quadrangle #1946-55
New York - Oneida County
7.5 Minute Series

Figure 2-1 Topographic Data

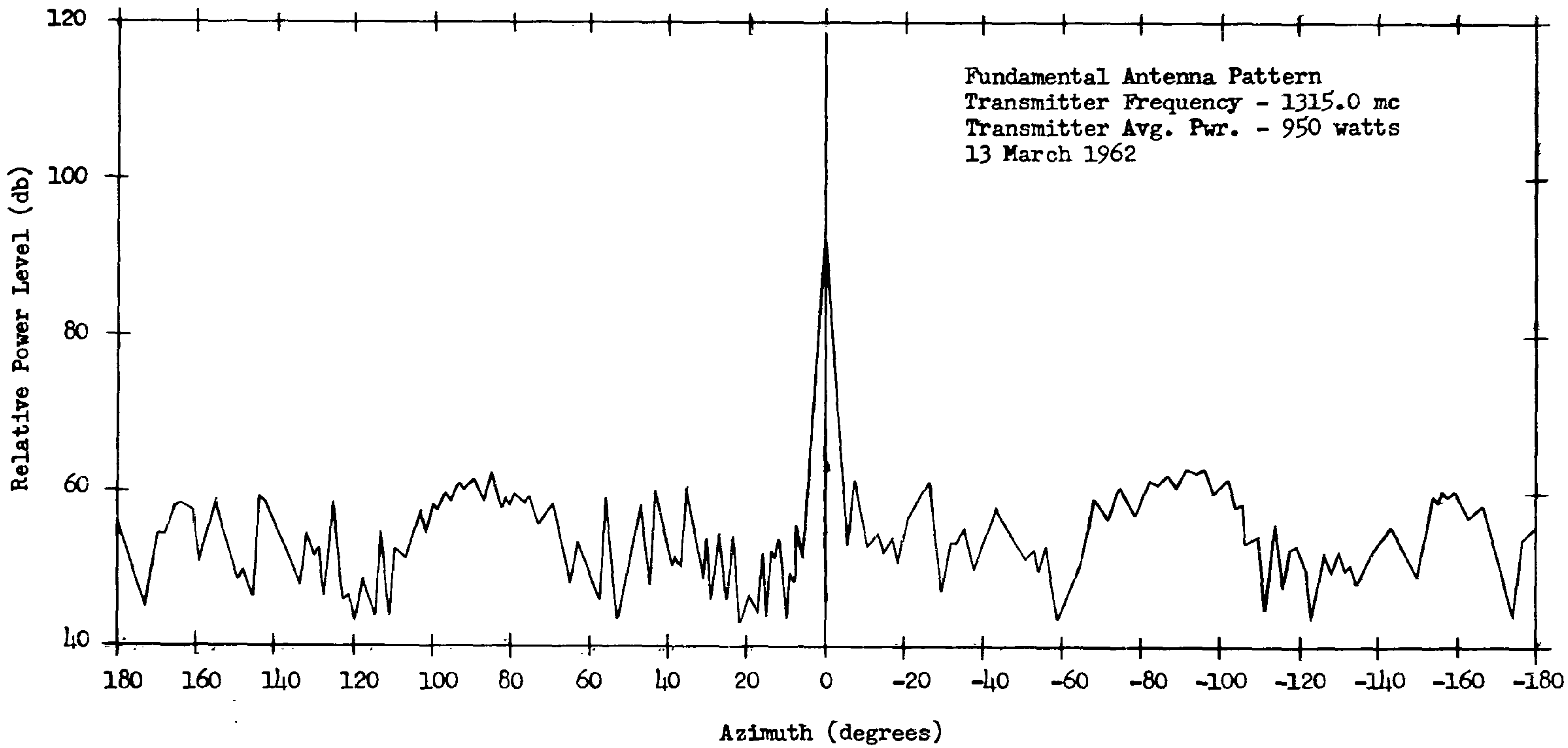


Figure 2-2 Site #1 Antenna Pattern

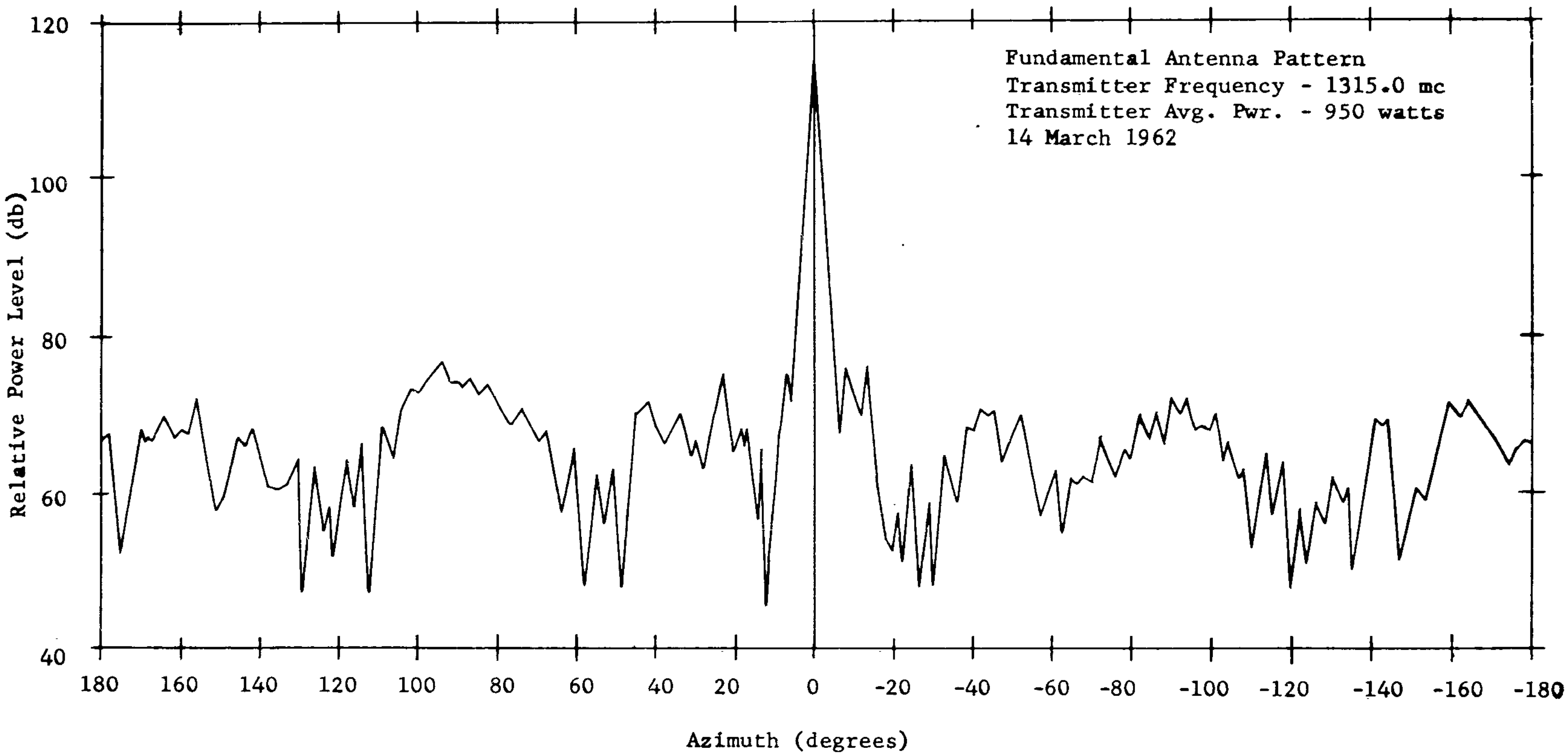


Figure 2-3. Site #2 Antenna Pattern

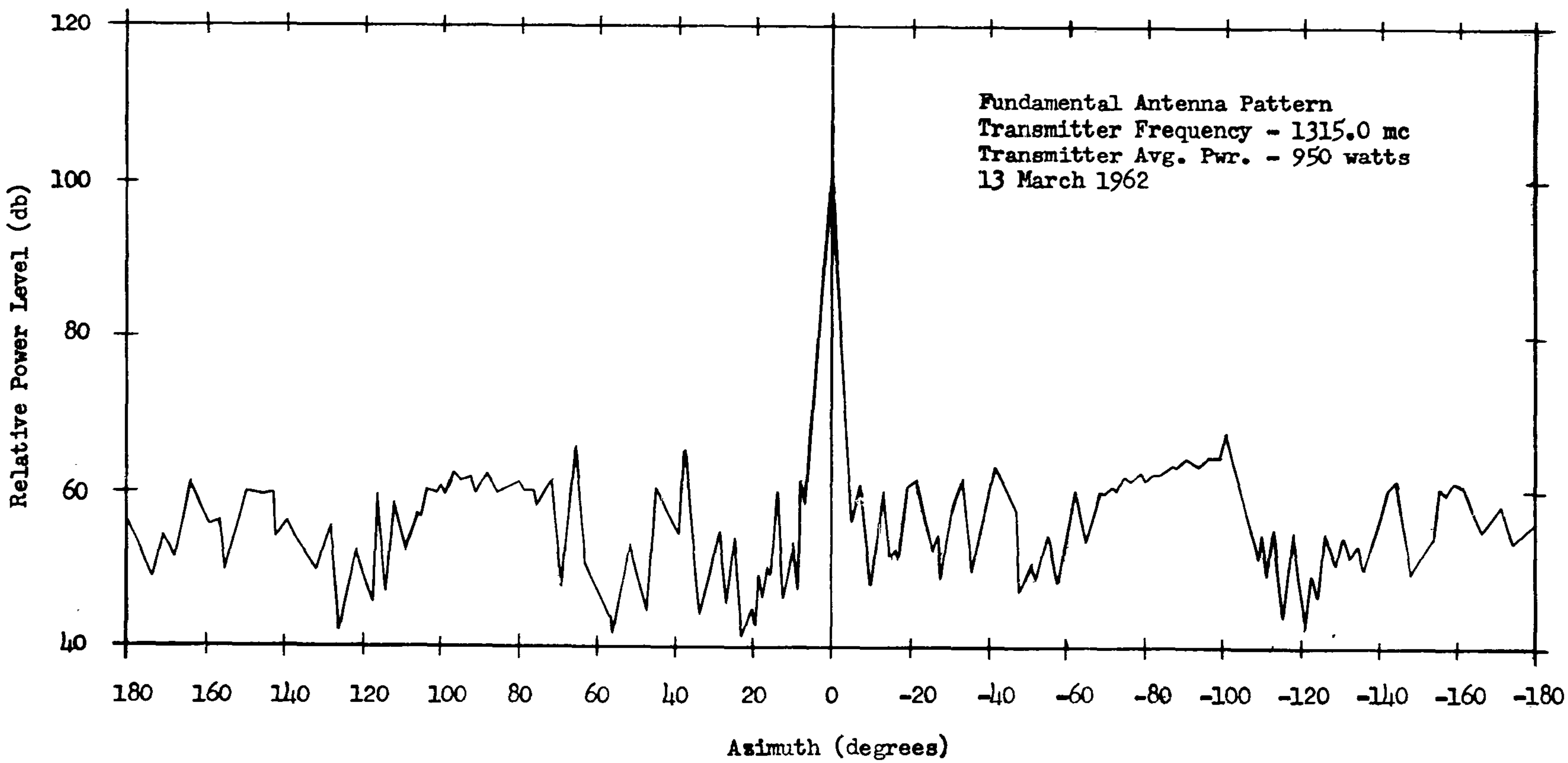


Figure 2-4   Site #3 Antenna Pattern

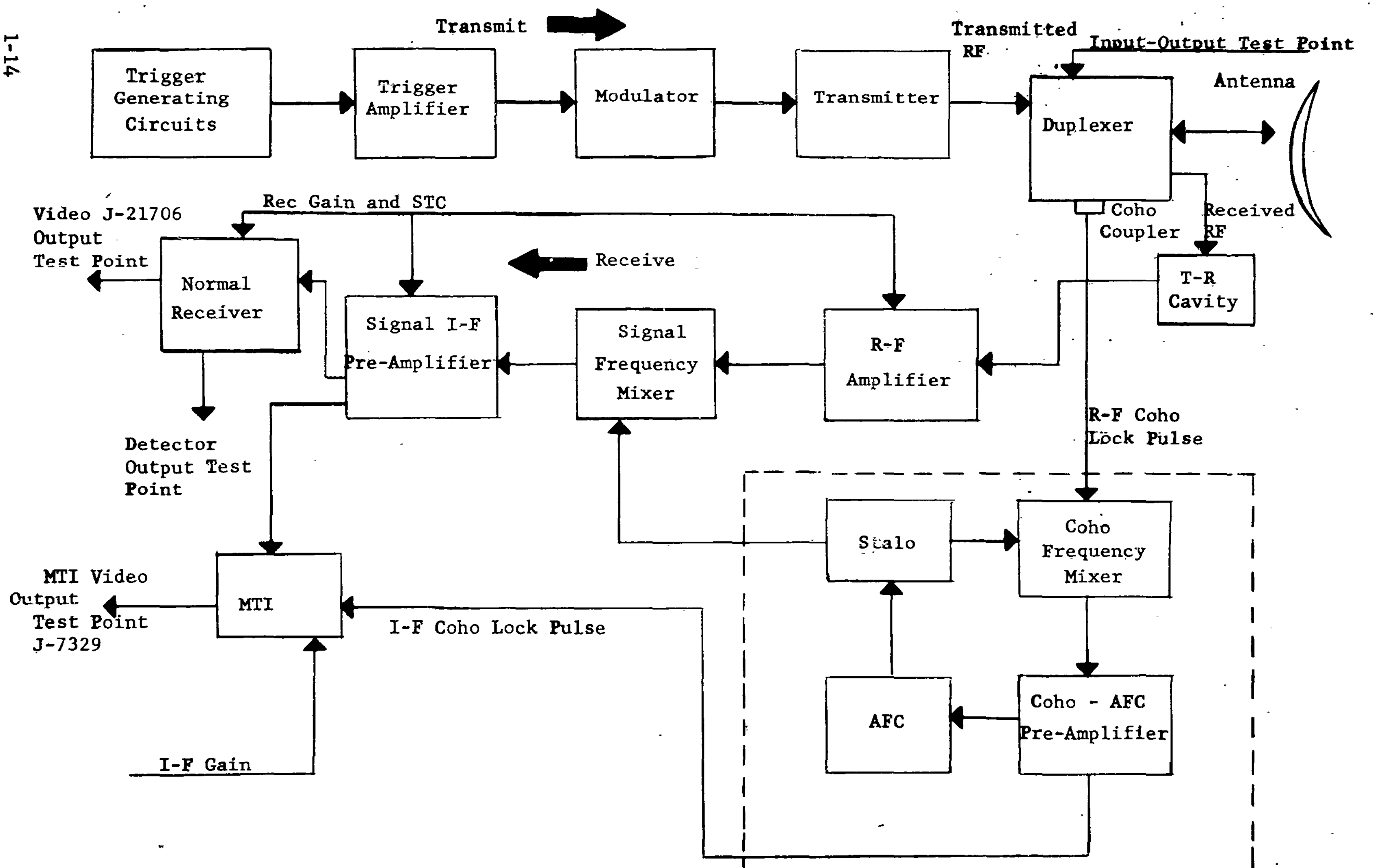


Figure 2-5
Radar Set AN/FPS-8, Detailed Block Diagram

PART II

Transmitter Testing

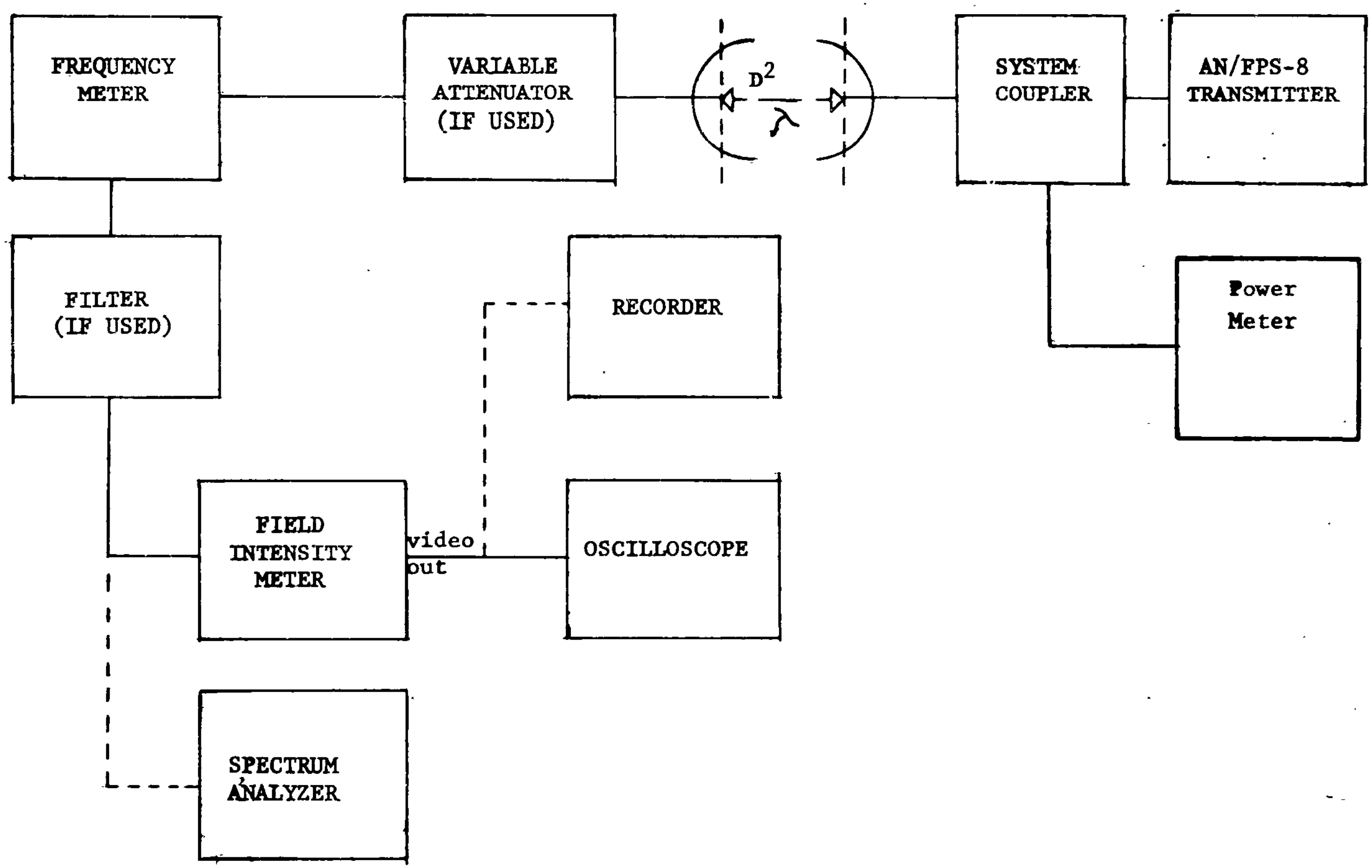


Figure 3.2.1 Diagram of Equipment Setup for Transmitter Measurements

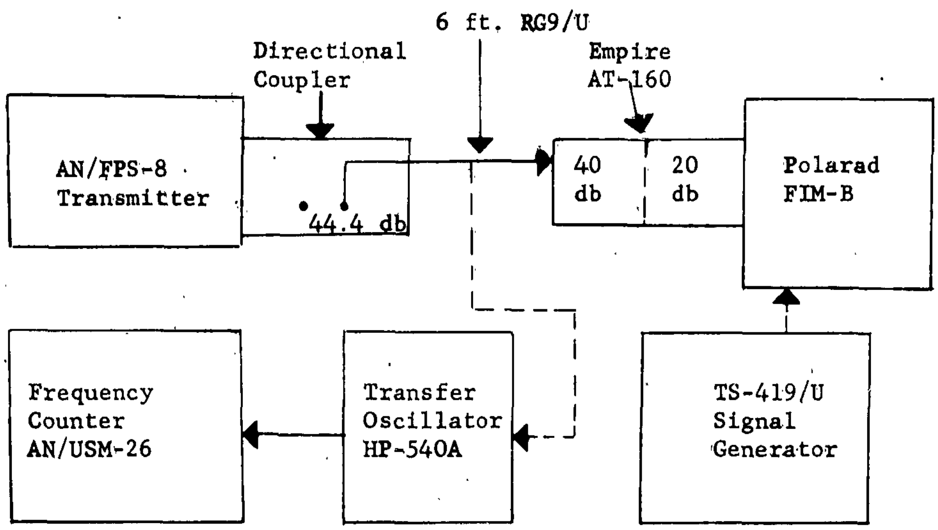


Figure 3.2.2 Power Output and Carrier Stability Test Set-up

3.1 Instrumentation The test equipment for the performance of the measurements in this section was in accordance with the requirements of Military Collection Plan for Spectrum Signatures, Revised September 1961.

3.2 Transmitter Measurements

3.2.1 Modulation The transmitter measurements were performed using a pulse width of 3.0 microsecond at a PRF of 360 pulses per second, unless otherwise indicated in the individual tests.

3.2.2 Power Output

3.2.2.1 General Since the fundamental power output of a transmitter may vary over the frequency coverage, the power should be measured at several frequencies throughout the tuning range.

3.2.2.2 Measurement Setup The test setup is shown in figure 3.2.2.

3.2.2.3 Procedure

(a) The peak power output was measured at the system directional coupler for each standard test frequency with the field intensity meter.

(b) The peak power readings were taken throughout the emission spectrum, spurious emission and antenna patterns and the average taken for each standard test frequency.

3.2.2.4 **Data**

Band L

Nominal Pulse Repetition Rate 360 pps

Nominal Pulse Width 3.0 usec

Frequency (mc/s)	PRD (pps)	PW (usec)	Peak Power Output (dbm)
1283.6	360	4.0	+88.2
1315.0	360	3.4	+88.9
1346.5	360	3.7	+88.5

3.2.3 Spurious Emission

3.2.3.1 General The purpose of this test is to scan the spectrum, locate, measure and record any spurious outputs of the transmitter under test.

3.2.3.2 Measurement Setup The test setup is shown in Figure 3.2.1. The "far-field" (D^2/λ) distance (890 feet) at Site #2 was used for this measurement. This test was performed in conjunction with Emission Spectrum (3.2.4) and Modulation Characteristics (3.2.5). The FPS-8 antenna focal point was 35 feet in height from ground level.

3.2.3.3 Procedure

(a) The transmitter was tuned to a standard test frequency.

(b) The field intensity meter was tuned to the transmitter's fundamental frequency.

(c) The test antenna was oriented in azimuth and elevation for a maximum reading on the Field Intensity Meter. The radar antenna was rotated in azimuth for a maximum response. The test antenna was reoriented for maximum response in the same plane of polarization as the radar antenna.

(d) A reference reading was obtained on the field intensity meter. The field intensity meter was disconnected from the test antenna and reconnected to a signal generator adjusted to simulate the received signal characteristics. The power output was adjusted to give the same reference reading as obtained from the test antenna. The signal generator power level and external attenuation in the signal path were recorded.

3.2.3.3 Procedure (Continued)

(e) The power density was computed by the use of the following equations:

$$PD\ (mw/m^2) = \text{Corrected Received Power in Milliwatts} \Big/ \frac{G\lambda^2}{4\pi} \quad \text{or}$$

$$PD\ (dbm/m^2) = P_{dbm} - G_{db} + 20\ \text{Log}\ F\ (mc) - 3.55$$

where G is the ratio gain of the receiving antenna and λ is the wavelength in meters of the detected signal. G_{db} is the ratio gain of the receiving antenna converted to db.

SAMPLE CALCULATION:

The power of a received signal is found to be + 38.1 dbm by the signal substitution method. The frequency of the signal is 1283.5 mc. The calibrated test antenna gain is 9.6 db.

$$20\ \text{Log}\ 1283.5 = 20 \times 3.108 = 62.16$$

$$PD = -80 -9.6 + 62.16 - 38.55 = + 58.11\ dbm/m^2$$

(f) The frequency of the fundamental or spurious was measured with a frequency meter of 0.01% accuracy.

(g) The field intensity meter was scanned from lower frequency limit of 1 kmc to an upper limit of 10 kmc. All detected signals were analyzed as in steps c. through f.

(h) Spurious emissions were determined to be originating in the radar equipment by a number of methods.

(1) Filters were used to cover only the particular band containing the spurious emission.

(2) Cavity wavemeters were inserted between the test antenna and the field intensity meter and used to determine if spurious emission could be attenuated.

3.2.3.3 Procedure (Continued)

(3) The test antenna was disconnected to determine if spurious emission would disappear.

(4) The PRF, pulse width and frequency were determined and correlated to the radar set under test.

(5) The transmitting antenna was rotated to each side of maximum response to determine if spurious emission power level could fall off.

(6) The transmitter under test was momentarily cut off to determine if the spurious emission would disappear.

(7) On a number of frequencies both a Polarad and an Empire Devices field intensity meter was used to correlate the results of the spurious emissions at the high, low and mean test frequencies.

(i) The spurious emission test was repeated at the standard test frequencies for all fundamental and spurious frequencies throughout the 1 kmc to 10 kmc frequency range.

3.2.3.4 Remarks

(a) The frequency meter was connected only for the measurement of the spurious emission frequency and for a part of the determination of the validity of the spurious frequency.

(b) The pulse widths of many of the spurious emissions has been left out of the data or is marked with an asterisk. This is due to the difficulty of determining the exact width of the double pulse phenomena as seen in Modulation Characteristics (3.2.5).

3.2.3.4 Remarks (Continued)

(c) The power densities recorded in the data sections were calculated from power levels obtained on the Polarad Field Intensity Meter, at the "far-field" measurement. The Polarad FIM has an overall measured bandwidth, at the 3 db point, of 5 megacycles on all bands of operation.

(d) The focal point of the FPS-8 and test antenna was 35 feet in height from ground level.

3.2.3.5 **Data** **Date** 23 April 1962

Table I

Transmitter Tuned Frequency 1283.5 mc

Frequency (mc)	Pulse Width (usec)	P.R.F. (pps)	θ (Deg.)	ϕ (Deg.)	Origin	Peak Power Density (dbm/m^2)
1283.5	4.0	360	0	0	Fund.	+58.11
1133.0	3.2*	360	0	0		-13.47
1477.9	2.0*	360	0	0		-16.67
1588.9	1.5*	360	0	0		-26.47
1667.5	1.6*	360	0	0		-30.03
1720.0	1.8*	360	0	0		-22.75
1921.0	1.2*	360	0	0		-41.19
2055.0	1.6*	360	0	0		-31.11
2132.0	1.2*	360	0	0		-27.49
2210.0	1.2*	360	0	0		-32.67
2420.0	1.2*	360	0	0		-39.89
2566.5	3.0	360	0	0	2nd.Harm.	-10.67
3007.0	*	360	0	0		-34.99
3407.0	0.6*	360	0	0		-24.01
3846.0	2.6	360	0	0	3rd.Harm.	- 5.35
5135.0	2.0	360	0	0	4th.Harm.	-29.35

* See Modulation Characteristics (3.2.5)

3.2.3.5 **Data** **Date** 21 April 1962

Table II

Transmitter Tuned Frequency **1316.1 mc**

Frequency (mc)	Pulse Width (usec)	P.R.F. (pps)	θ (Deg.)	ϕ (Deg.)	Origin	Peak Power Density (dbm/m^2)
1316.1	3.4	360	0	0	Fund.	+64.33
1135.0	8.0	360	0	0		- 9.95
1499.0	4.6	360	0	0		+12.47
1662.5	*	360	0	0		- 5.04
1751.5	*	360	0	0		-23.02
1823.8	*	360	0	0		-24.83
1968.8	*	360	0	0		-23.27
2099.5	*	360	0	0		-18.11
2214.1	*	360	0	0		-22.15
2319.0	*	360	0	0		-35.94
2421.5	*	360	0	0		-31.87
2493.5	*	360	0	0		-21.42
2634.9	3.9	360	0	0	2nd.Harm.	+ 4.46
3011.5	*	360	0	0		-36.28
3111.0	0.8	360	0	0		-31.30
3356.0	0.6	360	0	0		-30.64
3422.0	*	360	0	0		-33.87
3485.0	1.5	360	0	0		-34.11
3949.5	2.0	360	0	0	3rd.Harm.	-20.82
5264.4	3.6	360	0	0	4th.Harm.	- 1.82
6670.0	3.2	360	0	0		- 3.47

* See Modulation Characteristics (3.2.5)

3.2.3.5 **Data** **Date** 19 April 1962

Table III

Transmitter Tuned Frequency 1346.5 mc

Frequency (mc)	Pulse Width (usec)	P.R.F. (pps)	θ (Deg.)	φ (Deg.)	Origin	Peak Power Density (dbm/m^2)
1346.5	3.7	360	0	0	Fund.	+52.63
1132.2	6.9	360	0	0		-14.98
1531.2	3.7	360	0	0		+13.14
1841.0	1.2	360	0	0		-24.25
2049.3	*	360	0	0		-23.12
2315.5	*	360	0	0		-29.16
2470.0	1.0	360	0	0		-27.50
2546.0	1.0	360	0	0		-36.24
2693.5	3.8	360	0	0	2nd.Harm.	-25.35
3039.0	*	360	0	0		-31.40
3181.0	0.8	360	0	0		-29.20
3495.0	0.8	360	0	0		-27.59
4039.5	3.0	360	0	0	3rd.Harm.	-12.23
5386.0	2.4	360	0	0	4th.Harm.	-18.35

* See Modulation Characteristics (3.2.5)

3.2.4 Emission Spectrum Measurement

3.2.4.1 General The Power vs Frequency Test is used for pulsed transmitter spectrum display. This test shows the transmitter power distribution about the nominal frequency of the transmitter under test.

3.2.4.2 Measurement Setup The test setup is shown in Figure 3.2.1. The "far field" site was used for measurement of the emission spectrum. This test was conducted in conjunction with the Spurious Emission Test (3.2.3).

3.2.4.3 Procedure

(a) The transmitter was tuned to a standard test frequency.

(b) The field intensity meter was tuned to the transmitter frequency, and used to orient the test and transmitter antennas for maximum response which was measured and recorded.

(c) The spectrum analyzer was then connected to the test antenna and was tuned to the transmitter frequency.

(d) The spectrum analyzer was set for a suitable display of the emission spectrum picture, and the display photographed.

(e) Attenuation was added between the test antenna and the spectrum analyzer in 6 db steps, and at each step the amplitude of the received spectrum was recorded.

(f) The frequency deviation from the zero vertical line to the positive or negative vertical five (5) marker was recorded using the internal calibration of the spectrum analyzer.

(g) Using the information obtained in the preceeding steps, the power densities were calculated and graphs were plotted of the emission spectrum photographs. For a sample calculation, see "Remarks" section.

3.2.4.3 Procedure (Continued)

(h) The amplitude of the spectral power density of the received signal at the fundamental frequencies was calculated by the formula:

$$\text{Spectral Power Density (dbm/kc/m}^2\text{)} =$$

$$\text{Peak Power Density (dbm/m}^2\text{)} - 10 \log B_r$$

where B_r is the bandwidth of the field intensity meter = 5000 kilocycles. If the bandwidth of the receiving instrument is less than twice the reciprocal of the pulse width, the above formula must be modified to:

$$\text{Spectral Power Density} = \text{Peak Power Density} - 10 \log B_r + 10 \log (0.5 \tau B_r)$$

where τ is the pulse width in microseconds and B_r is the receiver bandwidth in megacycles.

At harmonics of the fundamental frequency, the appropriate formula is:

$$\text{Spectral Power Density} = \text{Peak Power Density} - (50 + 6n)$$

where n is the order of the harmonic, or

$$\text{Spectral Power Density} = \text{Peak Power Density} - (50 + 6n) + 10 \log (0.5 n \tau B_r)$$

if the receiver bandwidth is less than $2/\tau$.

3.2.4.3 Procedure (Continued)

SAMPLE CALCULATION:

Frequency is 2693.0 mc (2nd harmonic of 1346.5 mc)

From Spurious Emission Data: Peak power density = 25.35 dbm/m^2

Pulse width = 2.8 usec so that $2/(2.8 \times 10^{-6})$ or approximately, 787 kc, it is not necessary to compensate for receiver bandwidth in this case.

$$\text{Spectral Power Density} = -25.35 - 10 \log (5000) - (50 + 6 \times 2)$$
$$= -25.35 - 37.00 - 62 = -124.35 \text{ or}$$
approximately -124 dbm/kc/m^2

3.2.4.4 Remarks

(a) The sensitivity and dynamic range of the Polarad (SA-84) Spectrum Analyzer was found to change from frequency to frequency. The spectrum pictures in this report are of those signals that gave significant dynamic range for presentation.

(b) Example of Calculation of Frequency Spectrum Calibration

The example used is the second harmonic spurious frequency of the AN/FPS-8. The frequency of the spurious was 2634.9 mc.

Taking the center (maximum) component as 1 (=0 db), a graphical integration by Simpson's rule gives an area of 0.2542 mw - mc/m^2. We are dealing here with power densities of the spectrum envelope rather than absolute power levels, so the calibration of the spectrum will be in milliwatts per square meter, converted to dbm/m^2.

The bandwidth of this spectrum was approximately 2.05 megacycles (note that the bandwidth must not exceed 5 megacycles,

3.2.4.4 Remarks (Continued)

which is the bandwidth of the field intensity meter used to measure the peak power in the far field). The average power density component is then $0.2542/2.05 = 0.124$ mw/m^2.

The peak power density (from the Spurious Emission test) is +4.46 dbm. The Duty Cycle is (3.9 usec x 360 cps) = 0.0014. (log = -2.853). Since the PRF is 360 cps, the number of components is N_c = 2.05 mc/360 cps = 5694 (log = 3.7555)

The average power density (in db) is:

$$APD = 10 \log (\text{Peak Power Density}) + 10 \log (\text{Duty Cycle})$$
$$= 4.46 - 28.53 = -24.07 \text{ dbm/m}^2$$

Since the average power density component of the spectrum was calculated to be 0.124 mw/m^2 (log = -0.9066), the power density at the center frequency is:

$$(PD_{cen} - 10 \log 0.124) + 10 \log N_c$$
$$= APD = -24.07$$
$$\text{or } PD_{cen} (\text{dbm/m}^2) = 9.066 - 37.555 - 24.07$$
$$= -52.559 \text{ dbm/m}^2$$

(c) The calculation of spectral power densities is not related to the calibration of emission spectra. These are two distinctly different problems.

The emission spectrum represents the amplitudes of the frequency components of the output waveshape. Since these components are sinusoidal, their individual maximum powers will not, in general, add up to the maximum (peak) power of the output waveshape. However, the average power in the frequency spectrum,

3.2.4.4 Remarks (Continued)

which is the sum of the average powers in the components, must be the same as the average power output of the transmitter. Therefore, the frequency spectra are given in terms of average power levels.

The spectral power density is a function of received power and receiver bandwidth. It involves the total power received and the frequency range over which the power is distributed. It can be calculated at the fundamental and harmonics, but must be measured for spurious frequencies. The spectral power densities for fundamental and harmonic frequencies are tabulated in the "Data" section. They should not be considered part of the emission spectrum calibration.

3.2.4.5 Data

EMISSION SPECTRUM MEASUREMENT

Table I

Spectral Power Densities at Fundamental and Harmonic Frequencies

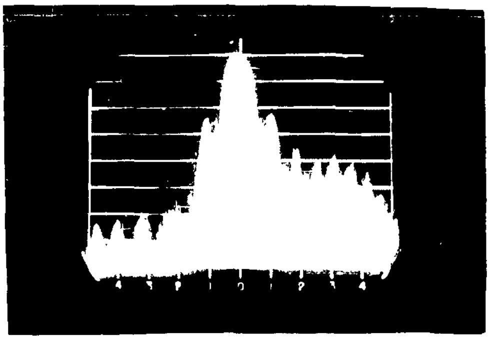
Transmitter Tuned Frequency (mc)	Fundamental or Harmonic being Analyzed	Δf (mc)	Spectral Power Density ($dbm/kc/m^2$)
1283.5	Fund.	-------	+ 21.11
2566.5	2nd. Harm.	+1283.0	- 109.67
3846.0	3rd. Harm.	+2562.5	- 73.35
5135.0	4th. Harm.	+3851.5	- 140.35
1316.1	Fund.	-------	+ 27.33
2634.9	2nd. Harm.	+1318.8	- 94.54
3949.5	3rd. Harm.	+2633.4	- 125.82
5264.4	4th. Harm.	+3948.3	- 112.82
1346.5	Fund.	-------	+ 15.63
2693.5	2nd. Harm.	+1347.0	- 124.35
4039.5	3rd. Harm.	+2693.0	- 117.23
5386.0	4th. Harm.	+4039.5	- 129.35

3.2.4.5 Data

A. LOW STANDARD TEST FREQUENCY

1. Fundamental Spectrum — Date 22 May 1962

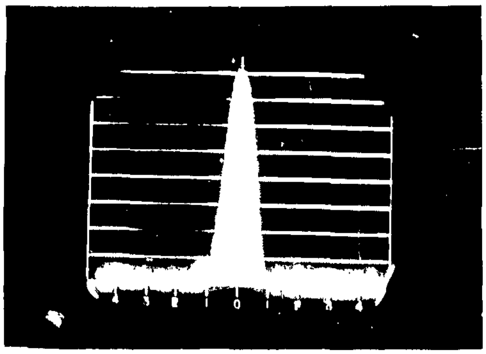
Transmitter Tuned Frequency - 1283.5 mc



2. Spurious Spectrum — Date 23 May 1962

Spurious Frequency - 2566.5 mc (2nd. Harmonic)

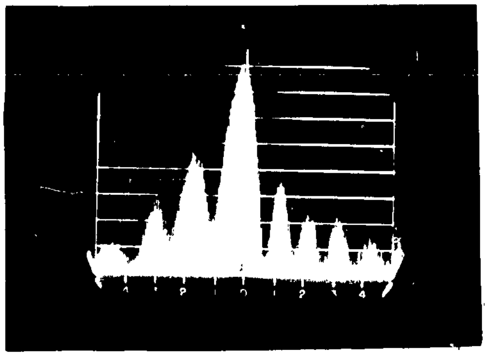
Transmitter Tuned Frequency 1283.5 mc



B. MEAN STANDARD TEST FREQUENCY

1. Fundamental Spectrum — Date 21 May 1962

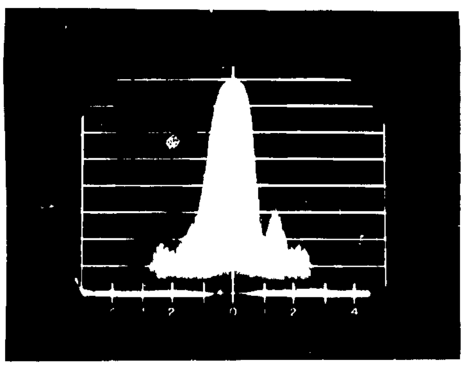
Transmitter Tuned Frequency 1315.5 mc



2. Spurious Spectrum — Date 22 May 1962

Spurious Frequency 2634.9 mc (2nd Harmonic)

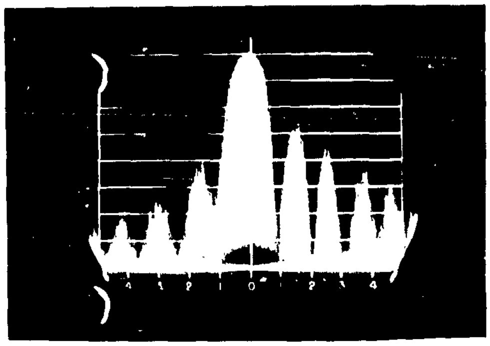
Transmitter Tuned Frequency 1315.5 mc



C. HIGH STANDARD TEST FREQUENCY

1. Fundamental Spectrum Date 19 May 1962

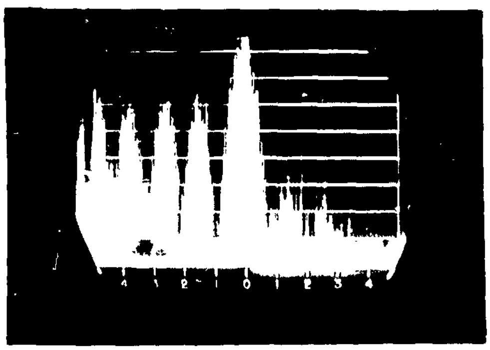
Transmitter Tuned Frequency 1346.5 mc



2. Spurious Spectrum Date 19 May 1962

Spurious Frequency 1531.2 mc

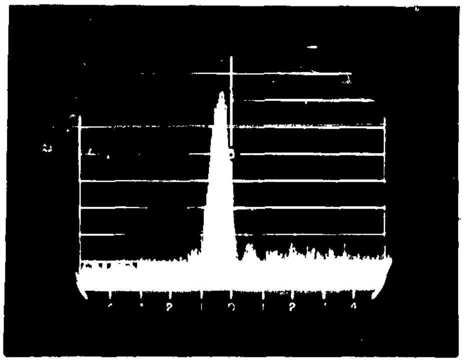
Transmitter Tuned Frequency 1346.5 mc

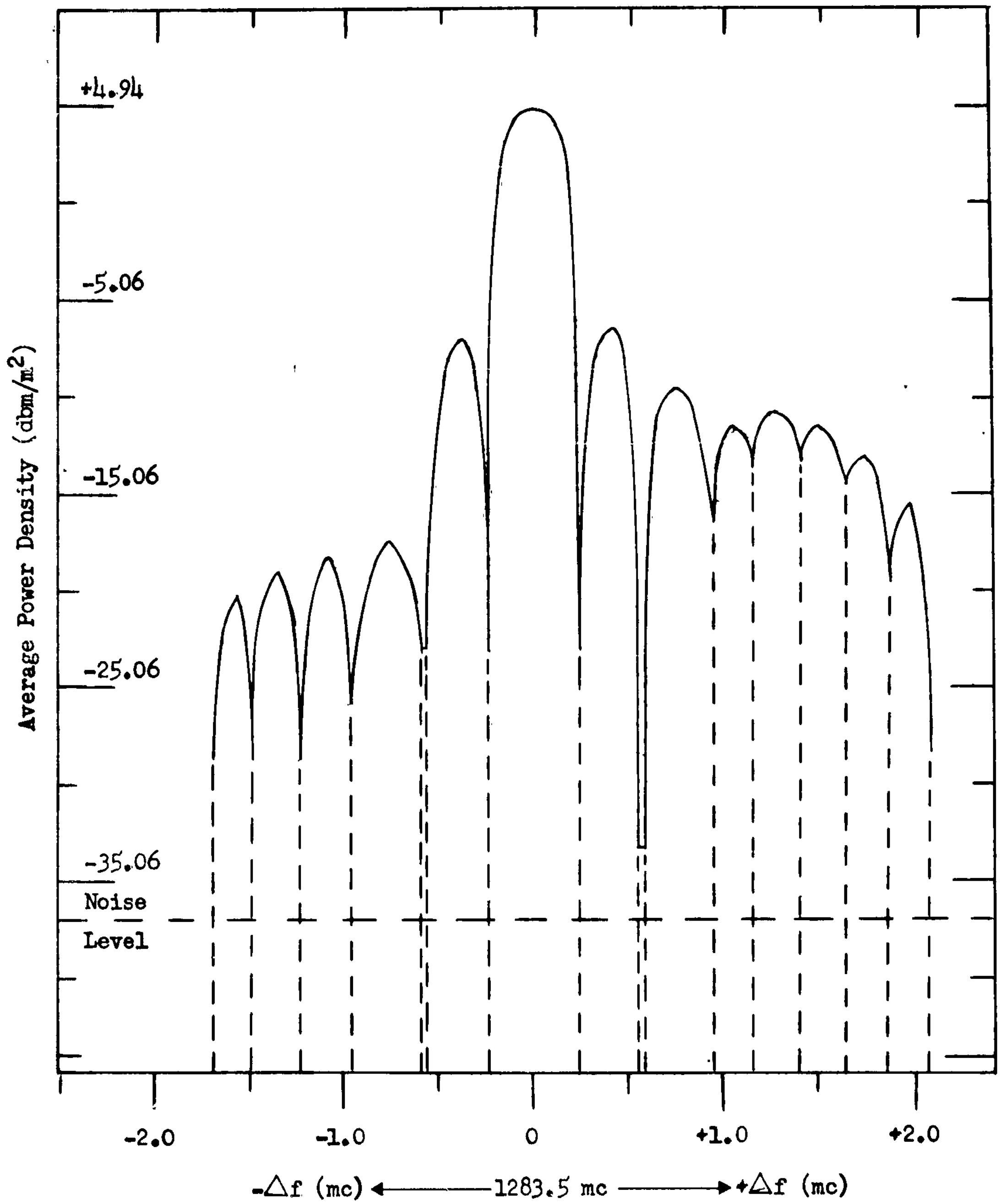


3. Spurious Spectrum Date 20 May 1962

Spurious Frequency 4039.5 mc (3rd Harmonic)

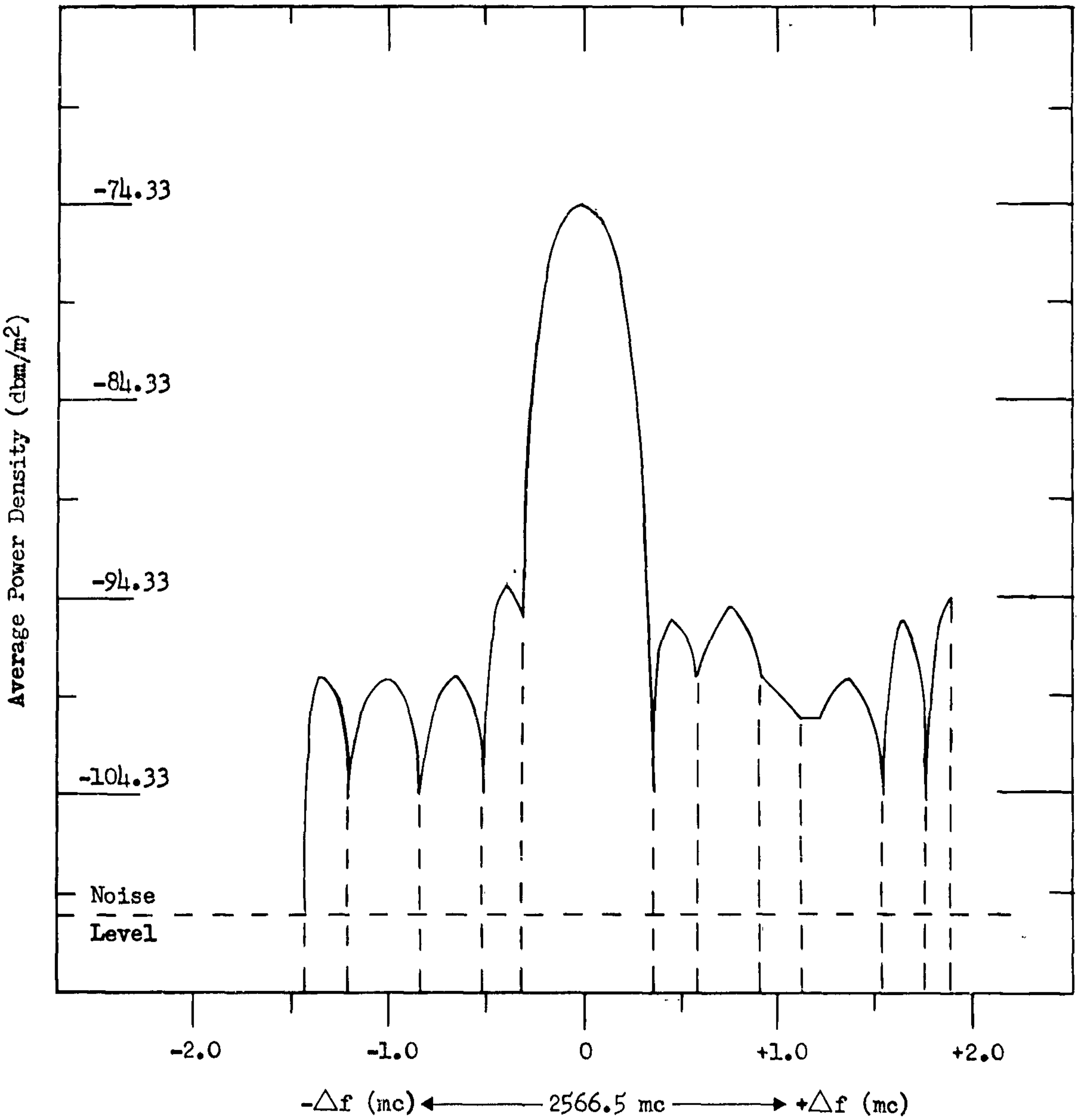
Transmitter Tuned Frequency 1346.5 mc





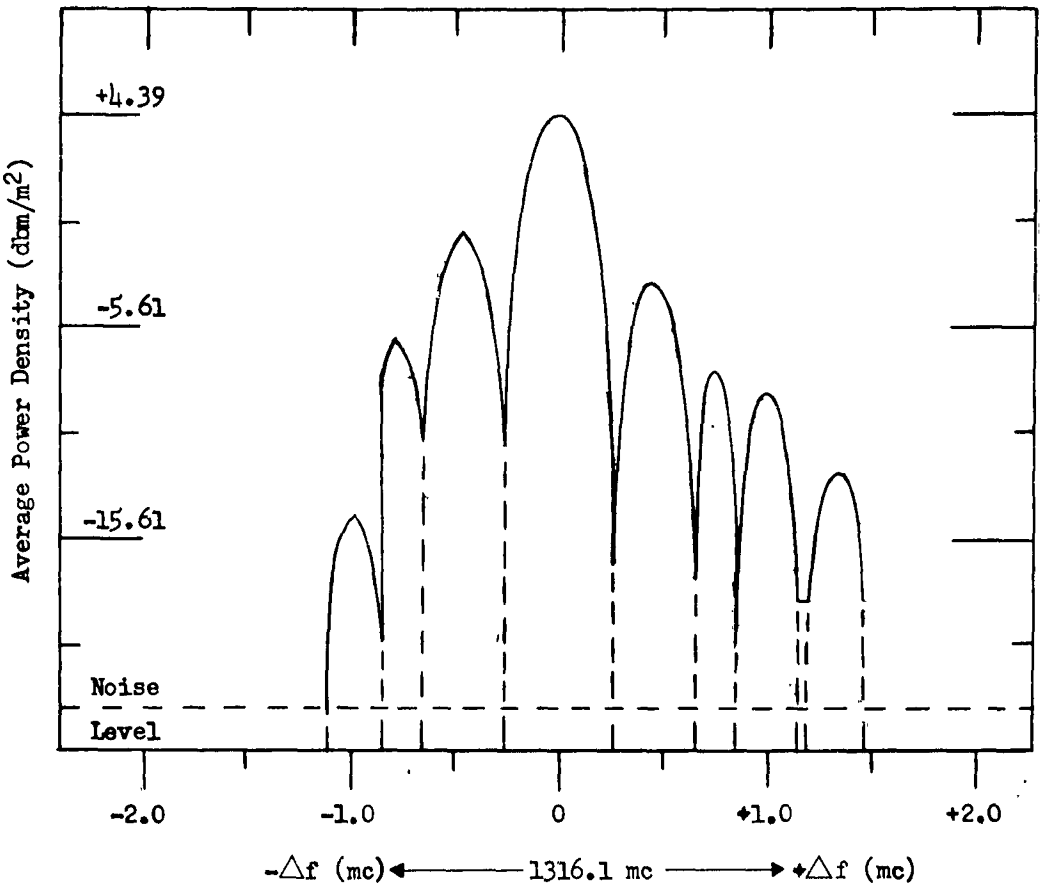
Transmitter Fundamental Frequency 1283.5 mc
Peak Power Level +4.94 dbm/m²

Figure 3.2.4.1 Emission Spectrum



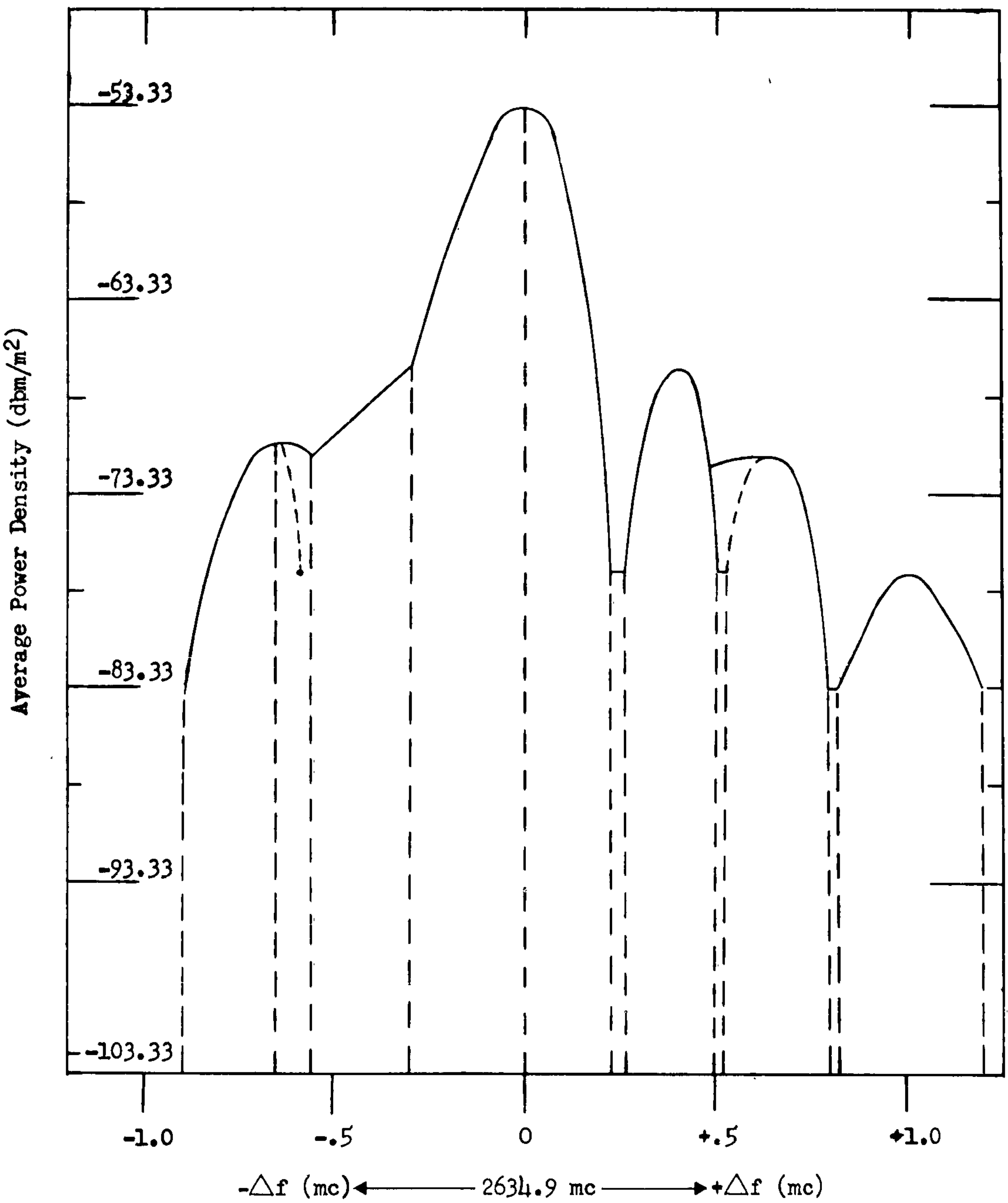
Transmitter Fundamental Frequency 1283.5 mc
Spurious Frequency 2566.5 mc (2nd Harmonic)
Peak Power Level -74.33 dbm/m^2

Figure 3.2.4.2 Emission Spectrum



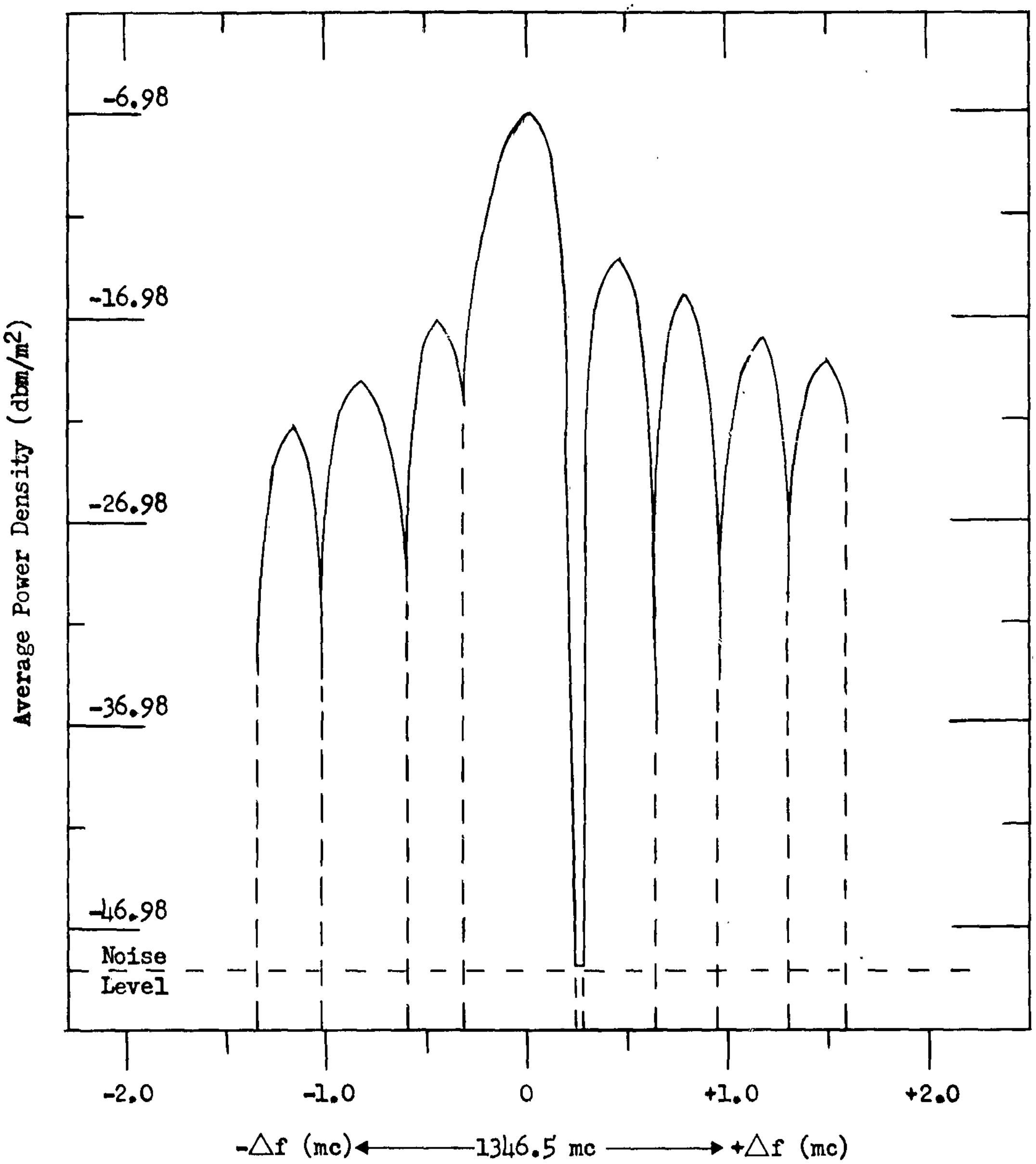
Transmitter Fundamental Frequency 1316.1 mc
Peak Power Level +4.39 dbm/m²

Figure 3.2.4.3 Emission Spectrum



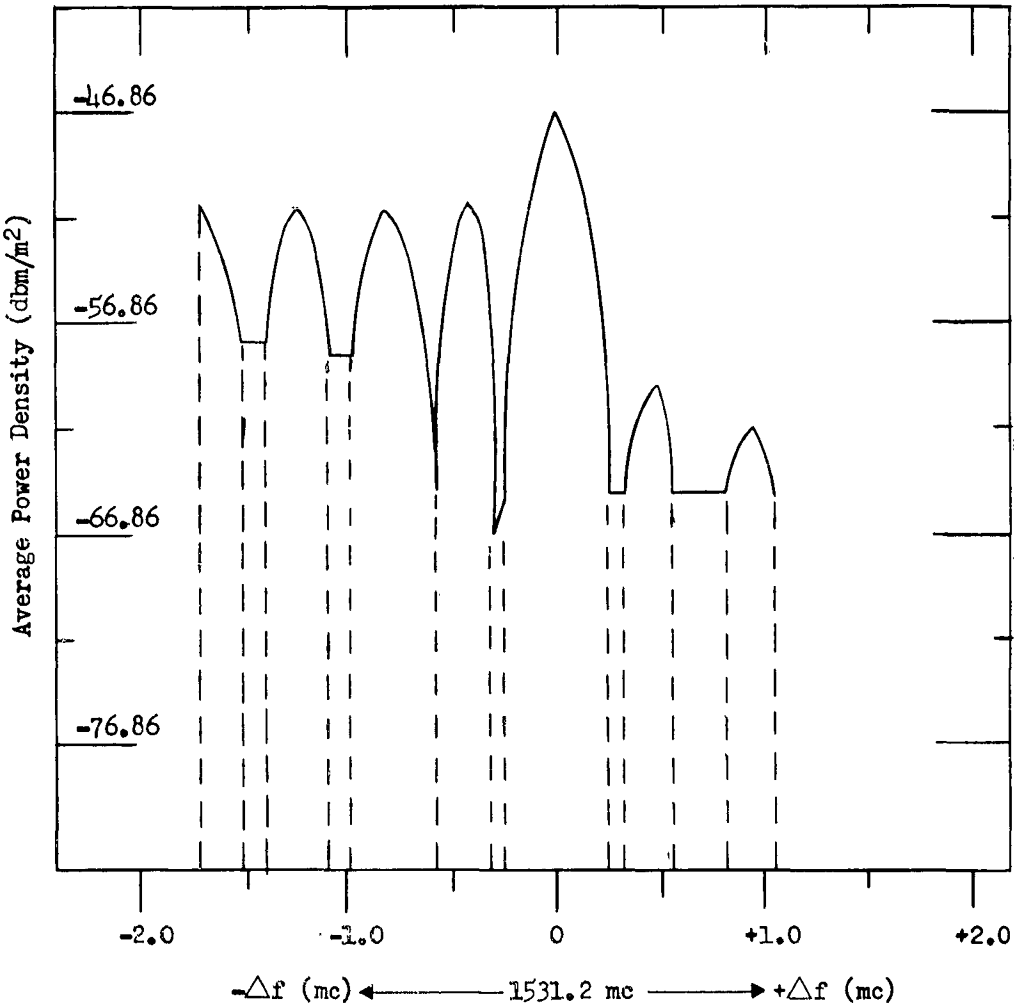
Transmitter Fundamental Frequency 1316.5 mc
Spurious Frequency 2634.9 mc (2nd Harmonic)
Peak Power Level -53.33 dbm/m^2

Figure 3.2.4.4 Emission Spectrum



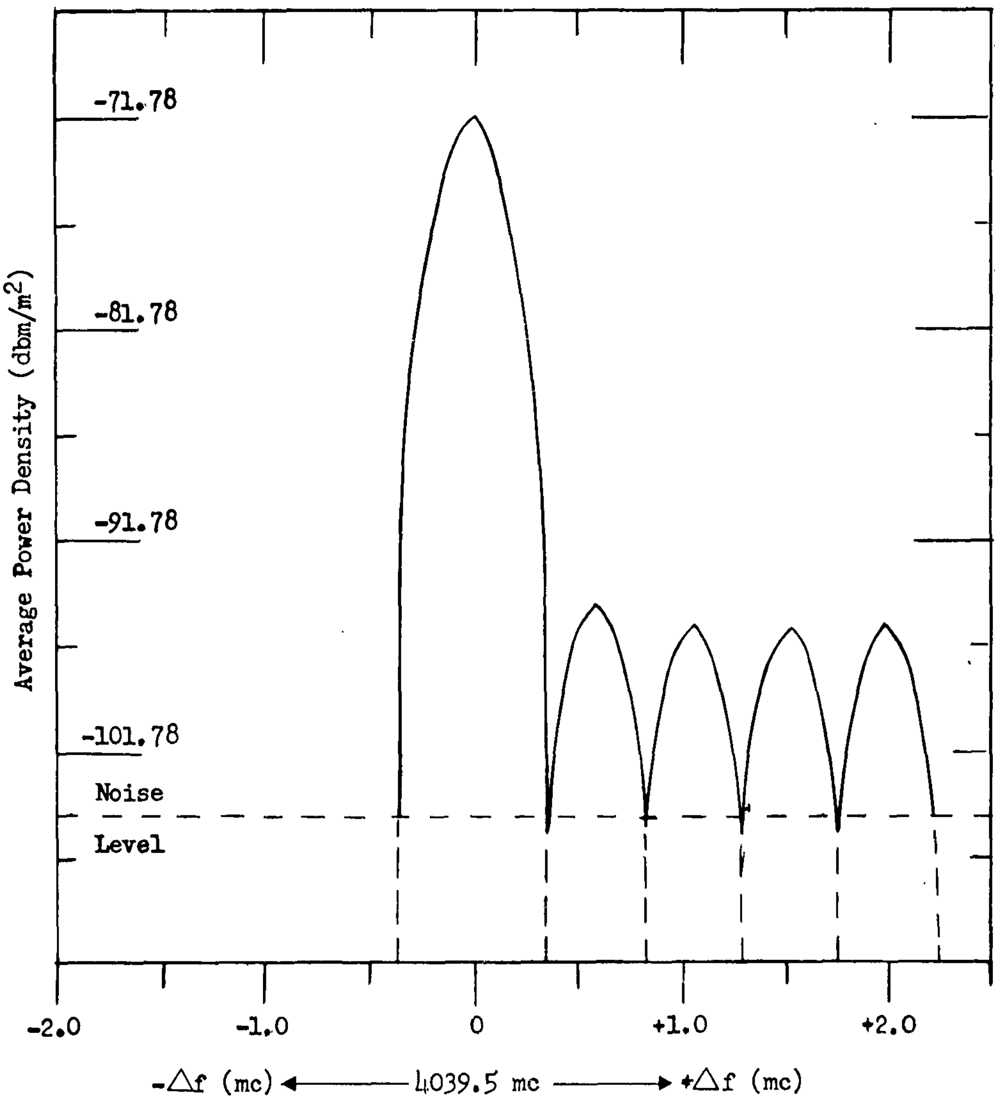
Transmitter Fundamental Frequency 1346.5 mc
Peak Power Level -6.98 dbm/m^2

Figure 3.2.4.5 Emission Spectrum



Transmitter Fundamental Frequency 1346.5 mc
Spurious Frequency 1531.2 mc
Peak Power Level -46.86 dbm/m^2

Figure 3.2.4.6 Emission Spectrum



Transmitter Fundamental Frequency 1346.5 mc
Spurious Frequency 4039.5 mc (3rd Harmonic)
Peak Power Level -71.78 dbm/m²

Figure 3.2.4.7 Emission Spectrum

3.2.5 Modulation Characteristics

3.2.5.1 General The purpose of this test is to recover information on the amplitude versus time characteristics of the system radiated outputs at fundamental, harmonics and spurious frequencies.

3.2.5.2 Measurement Setup The test setup is shown in Figure 3.2.1. The "far field" location, site #2, was used for this measurement. The pulse characteristics are taken from the video output on the field intensity meter and observed on a calibrated oscilloscope. This test was performed in conjunction with Spurious Emission Test (3.2.3.).

3.2.5.3 Procedure

(a) The transmitter was tuned to a standard test frequency.

(b) The field intensity meter was tuned to the transmitter frequency and the test and transmitter antennas were aligned for maximum response.

(c) The video output of the field intensity meter was fed to the vertical input and delayed sync input of a Tektronix 545 Oscilloscope. The delay of the oscilloscope sweep was set to give a waveform display in the center of the oscilloscope trace.

(d) The modulation waveform of the fundamental frequency was photographed and the calibration data of the oscilloscope was recorded.

(e) The modulation waveforms of the spurious emissions were taken in conjunction with the Spurious Emission Test (3.2.3) using the same method described above.

3.2.5.3 Procedure (Continued)

(f) This was repeated for all standard test frequencies and their spurious emissions.

3.2.5.4 Remarks and Discussion

(a) As can be seen from the data in 3.2.5.5, the double pulse phenomena occurs often in the modulation waveform of the spurious emissions at the different test frequencies. An effort was made to determine the validity of these waveforms by using two field intensity meters (Polarad FIM, Model B and Empire Devices NF112) plus preselector cavities inserted between the test antenna and the field intensity meter.

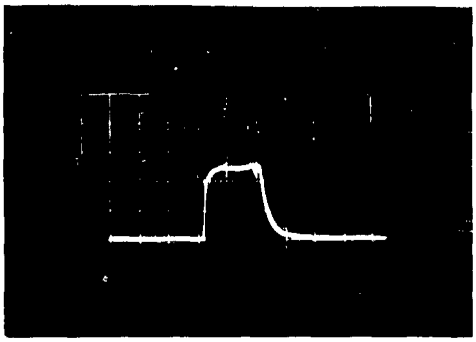
(b) Each photograph was taken with the field intensity meter tuned to give the best possible rectangular waveform.

(c) Due to the multiple pulse widths of many of the waveforms, a measurement of the pulse width was not recorded in the Spurious Emission Data (3.2.3.5).

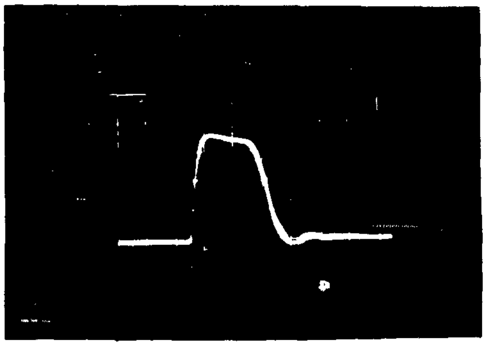
3.2.5.5 Data

(A) Low Test Frequency 1283.5 mc   Date 22 May 1962

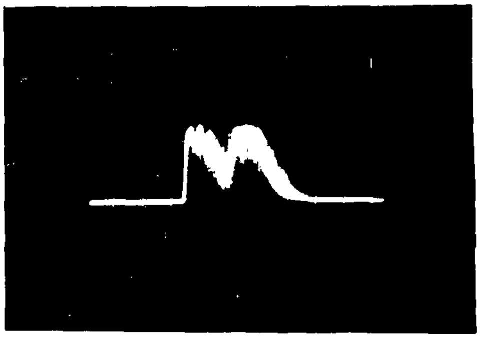
(1) Nominal Pulse Width - 3 usec
Pulse Repetition Frequency - 360 pps
Oscilloscope Settings and the FIM used in taking the picture are indicated under each photograph.



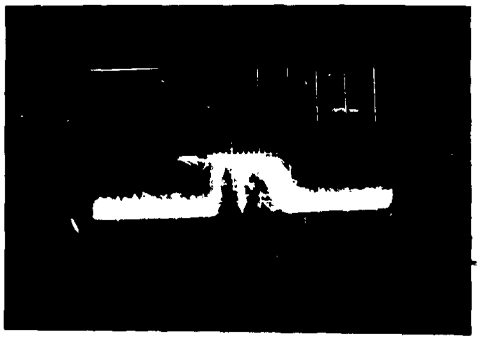
Fundamental Frequency 1283.5 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM - Model B



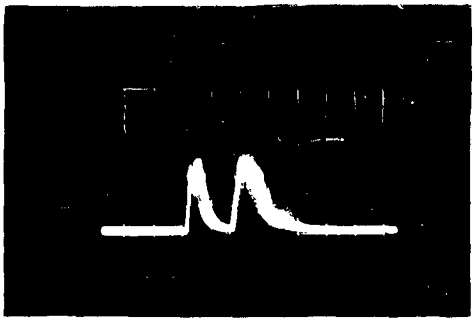
Fundamental Frequency 1283.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices - NF112



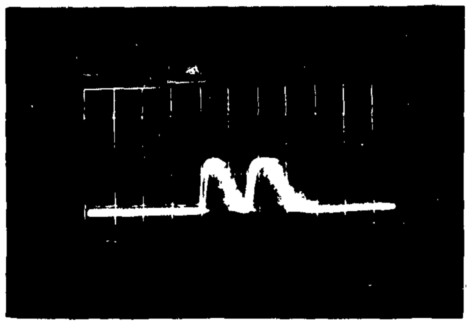
Spurious Frequency 1133.0 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM - Model B



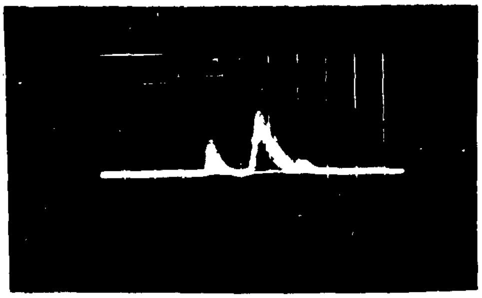
Spurious Frequency 1133.0 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices - NF112



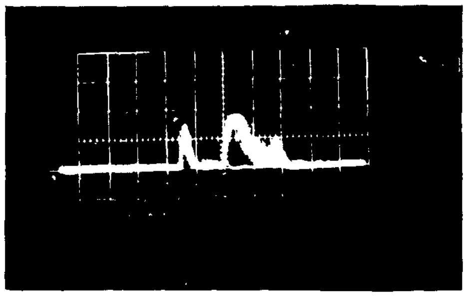
Spurious Frequency 1477.9 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



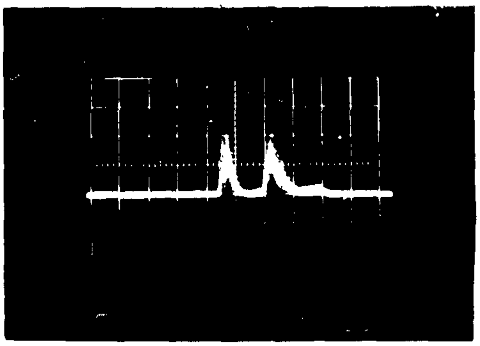
Spurious Frequency 1477.9 mc
Horiz - 2 usec/cm
Vert -1 volt/cm
Empire Devices NF112



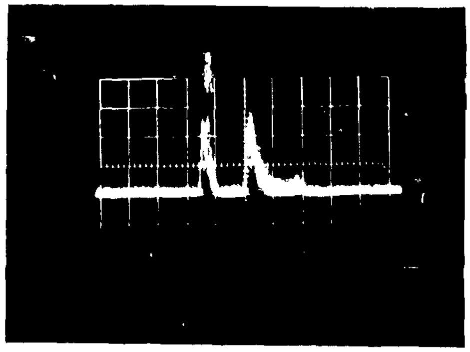
Spurious Frequency 1588.0 cm
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



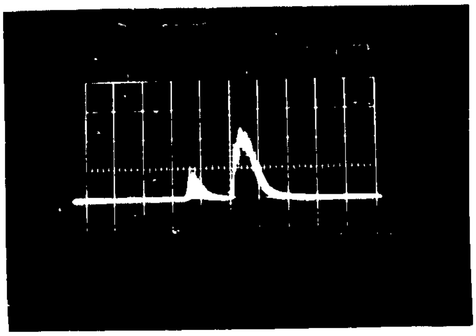
Spurious Frequency 1588.0 cm
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



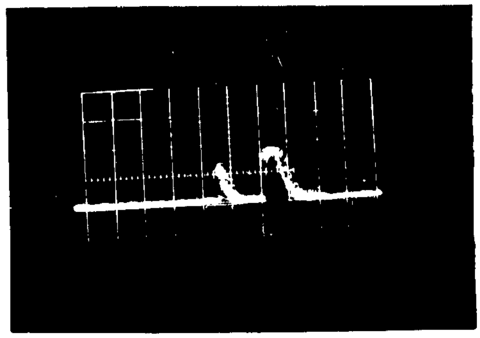
Spurious Frequency 1667.5 cm
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



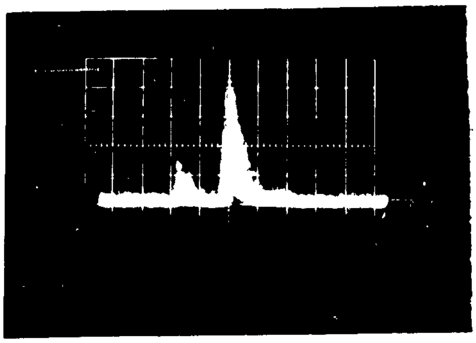
Spurious Frequency 1667.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



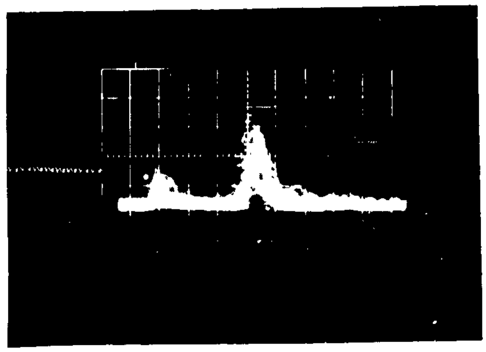
Spurious Frequency 1720.0 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



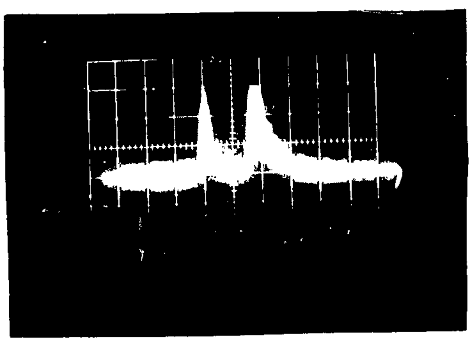
Spurious Frequency 1720.0 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



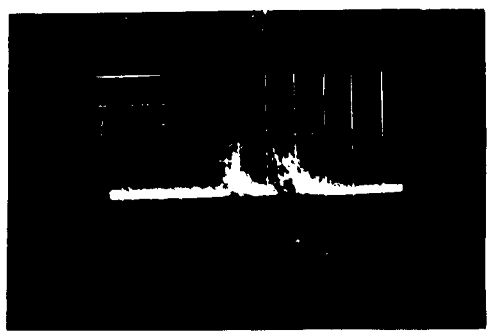
Spurious Frequency 1921.0 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



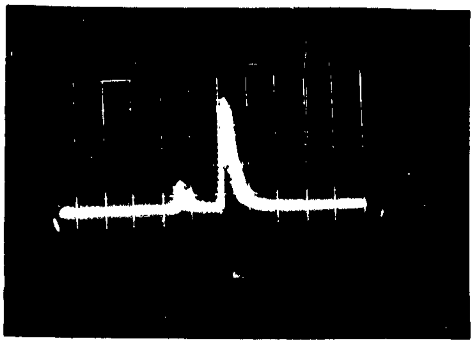
Spurious Frequency 1921.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



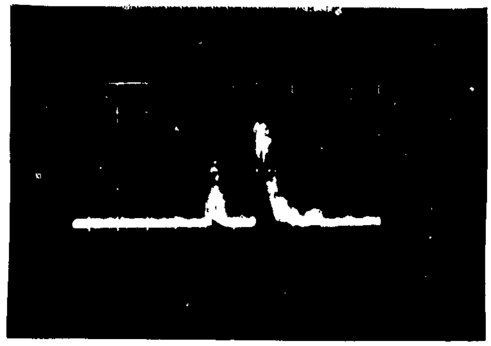
Spurious Frequency 2055.0 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



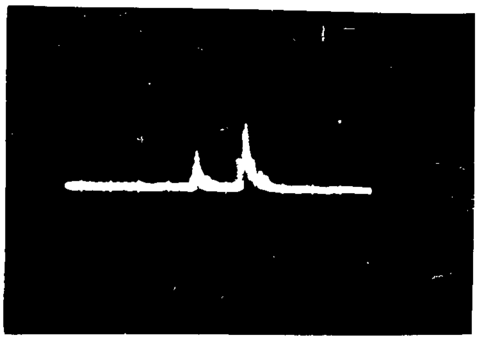
Spurious Frequency 2055.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



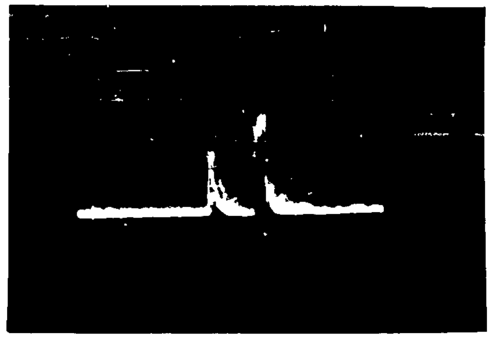
Spurious Frequency 2132.0 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



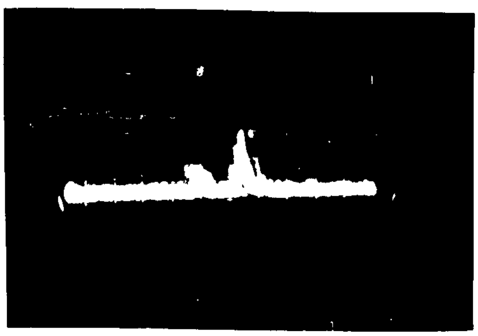
Spurious Frequency 2132.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



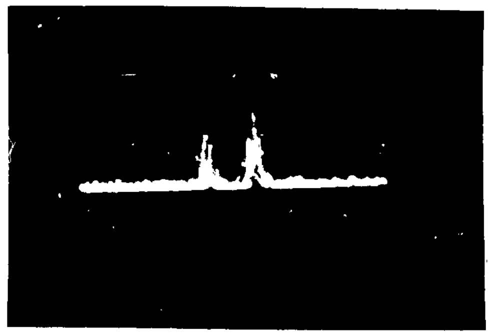
Spurious Frequency 2210.0 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



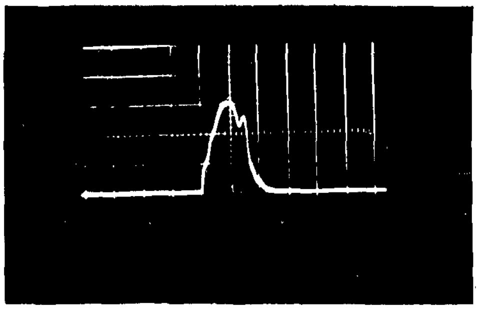
Spurious Frequency 2210.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



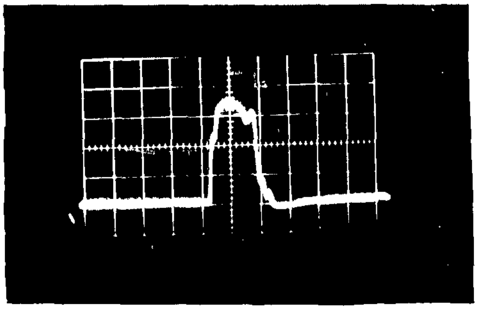
Spurious Frequency 2420.0 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



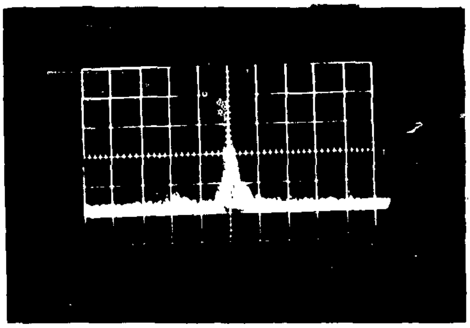
Spurious Frequency 2420.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



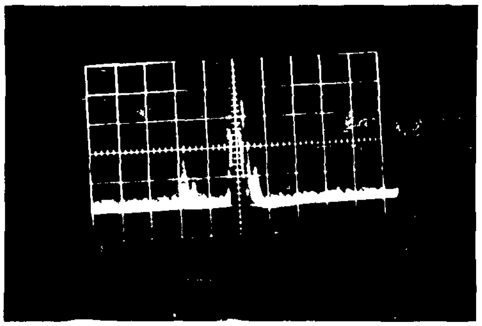
Second Harmonic 2566.5 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



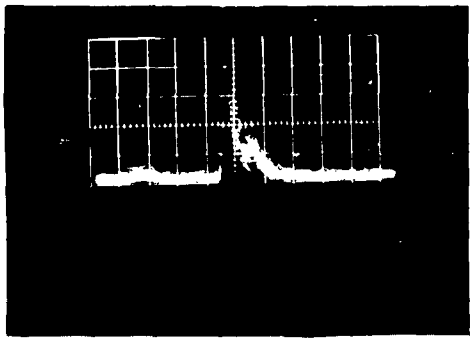
Second Harmonic 2566.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



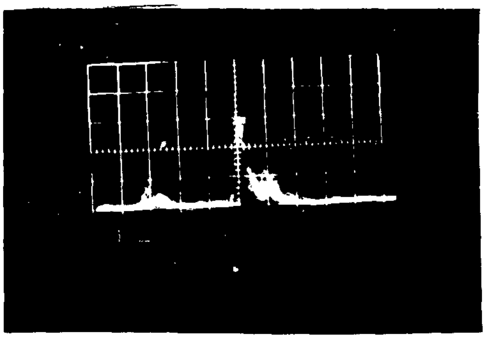
Spurious Frequency 3007.0 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



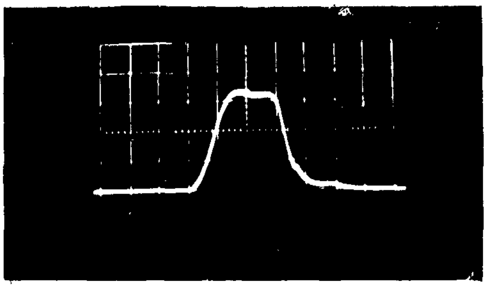
Spurious Frequency 3007.0 mc
Horiz - 2 usec/cm
Vert - 0.2 volts/cm
Empire Devices NF112



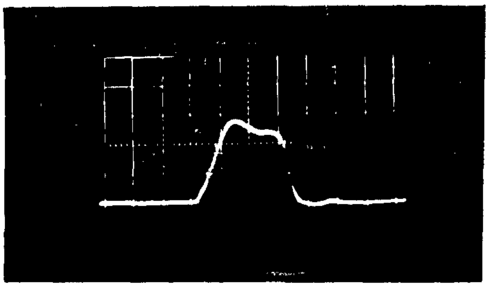
Spurious Frequency 3407.0 mc
Horiz - 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



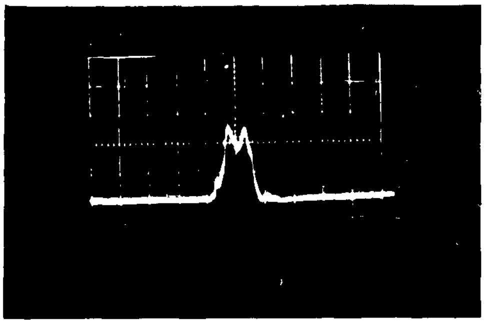
Spurious Frequency 3407.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



Third Harmonic 3846.0 mc
Horiz - 1 usec/cm
Vert - 5 volts/cm
Polarad FIM-Model B



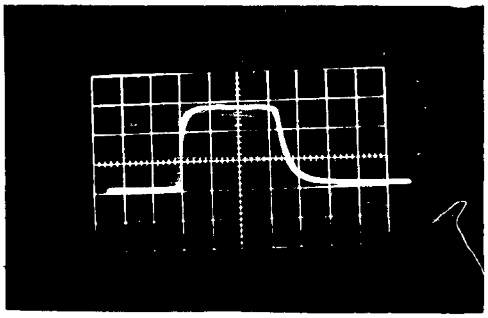
Third Harmonic 3846.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices - NF112



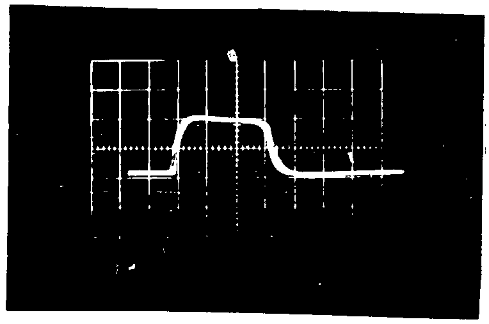
Fourth Harmonic 5135.0 mc
Horiz - 2 usec/cm
Vert - 0.2 volts/cm
Empire Devices - NF112

(B) Mean Test Frequency 1361.1 mc Date 21 May 1962

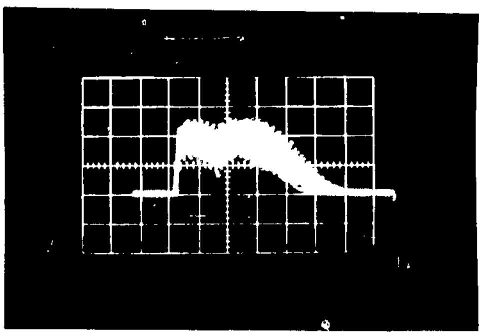
(1) Nominal Pulse Width - 3 usec
Pulse Repetition Frequency - 360 pps
Oscilloscope Setting and the FIM used in taking the picture are indicated under each photograph.



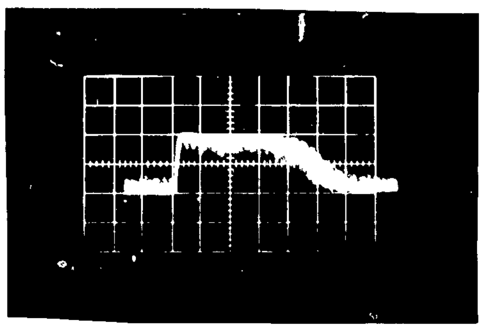
Fundamental Frequency 1316.1 mc
Horiz - 1 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



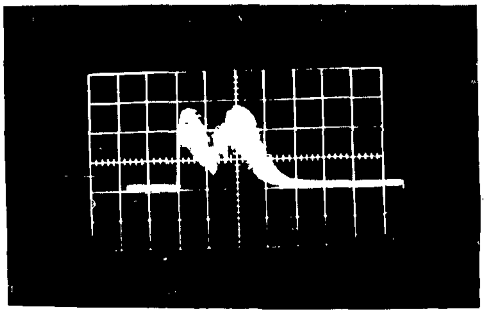
Fundamental Frequency 1316.1 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



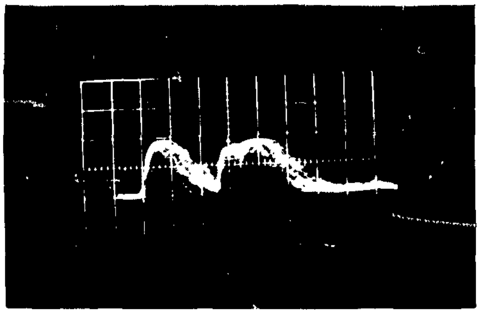
Spurious Frequency 1135.0 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



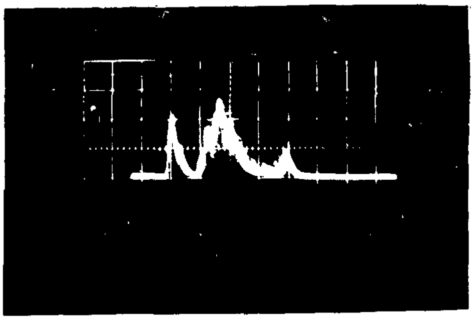
Spurious Frequency 1135.0 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



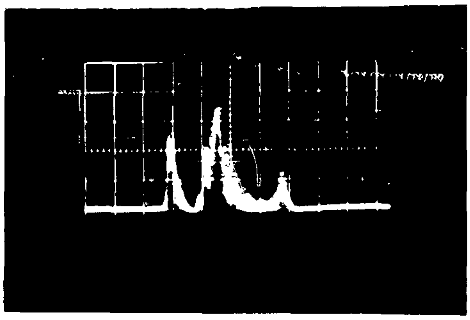
Spurious Frequency 1499.3 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



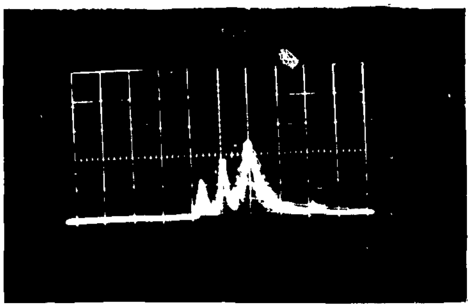
Spurious Frequency 1499.3 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



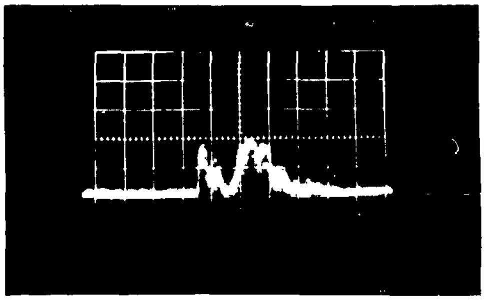
Spurious Frequency 1662.5 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



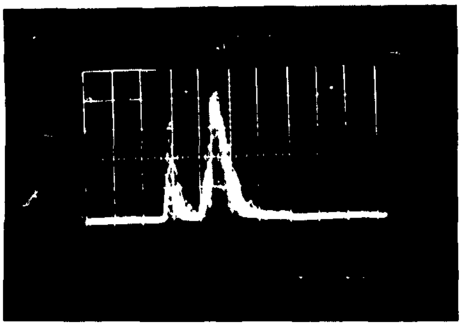
Spurious Frequency 1662.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



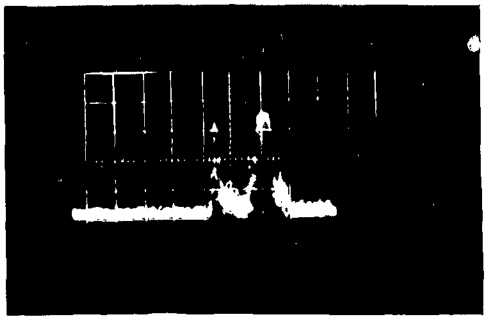
Spurious Frequency 1751-5 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



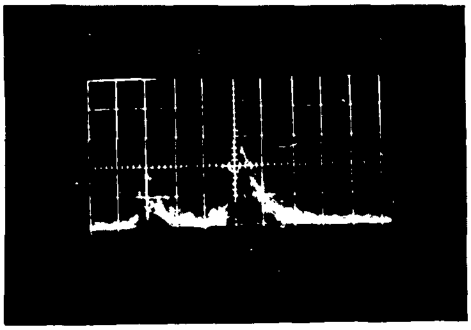
Spurious Frequency 1751.5 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



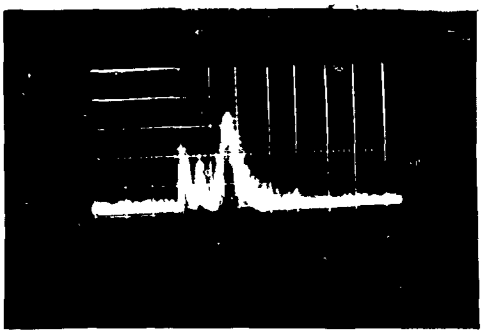
Spurious Frequency 1823.8 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



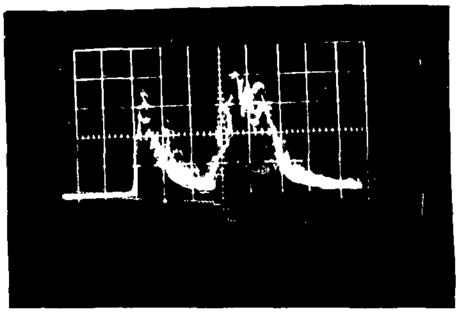
Spurious Frequency 1823.8 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



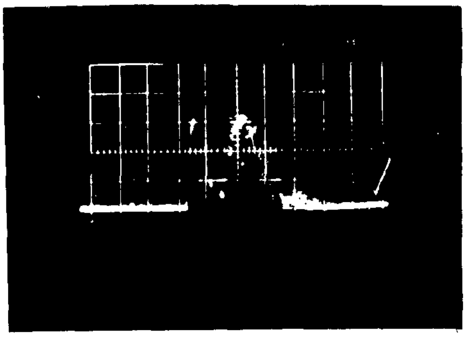
Spurious Frequency 1968.8 mc
Horiz - 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



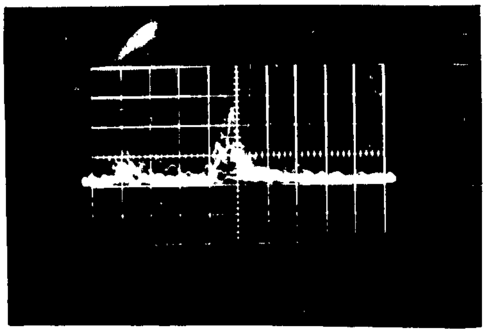
Spurious Frequency 1968.8 mc
Horiz - 2 usec/cm
Vert- 0.5 volts/cm
Empire Devices NF112



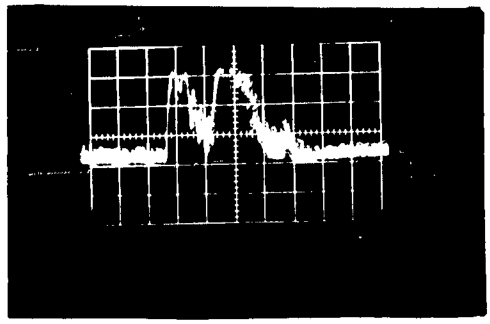
Spurious Frequency 2099.5 mc
Horiz - 1 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



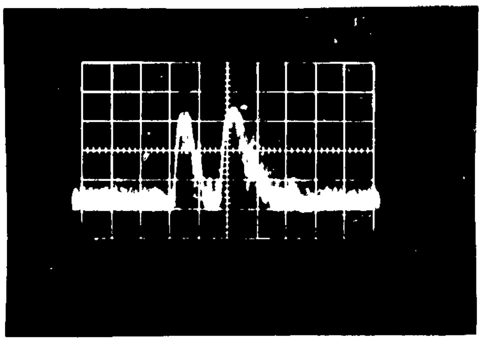
Spurious Frequency 2099.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



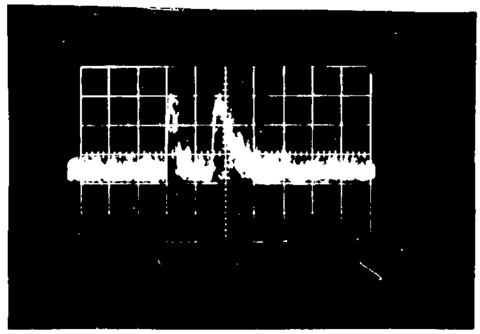
Spurious Frequency 2214.1 mc
Horiz - 1 usec/ cm
Vert - 2 volts/cm
Polarad FIM Model B



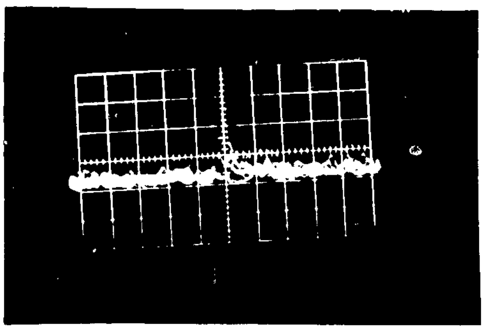
Spurious Frequency 2214.1 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



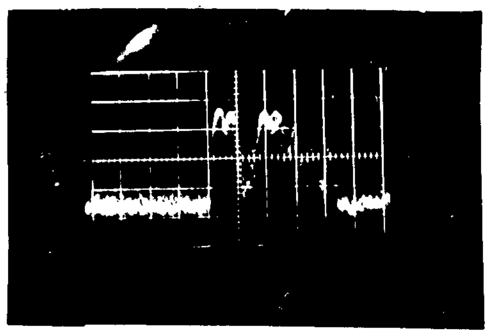
Spurious Frequency 2214.1 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112 with
Pre-selector



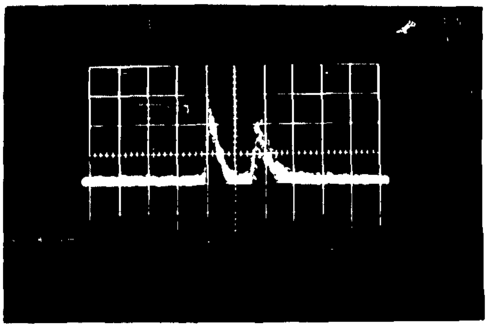
Spurious Frequency 2319.0 mc
Horiz -2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



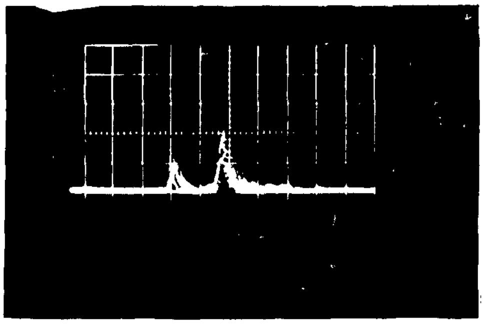
Spurious Frequency 2319.0 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Polarad FIM Model B



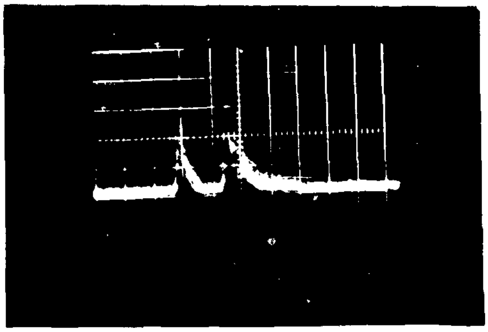
Spurious Frequency 2421.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



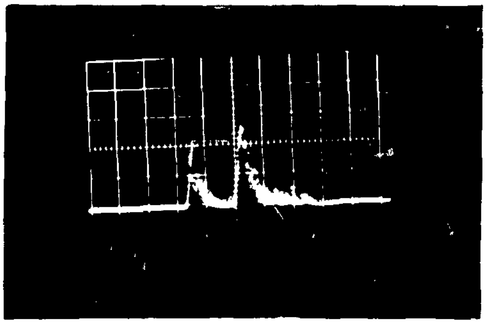
Spurious Frequency 2421.5 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



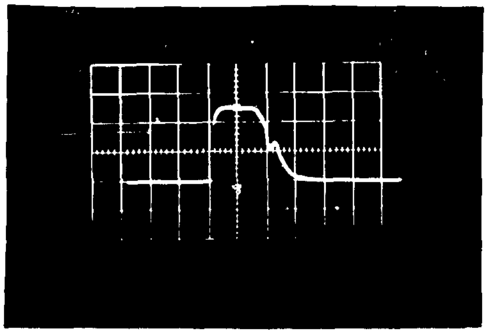
Spurious Frequency 2493.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112 with Pre-selector



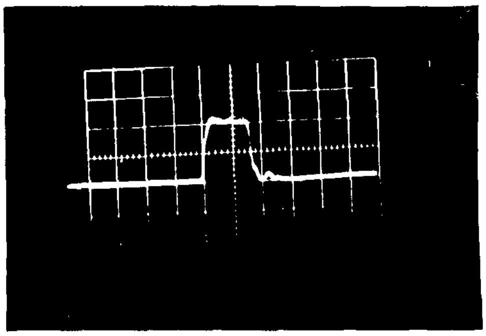
Spurious Frequency 2493.5 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



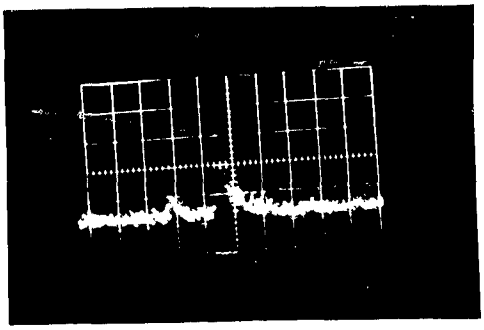
Spurious Frequency 2493.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



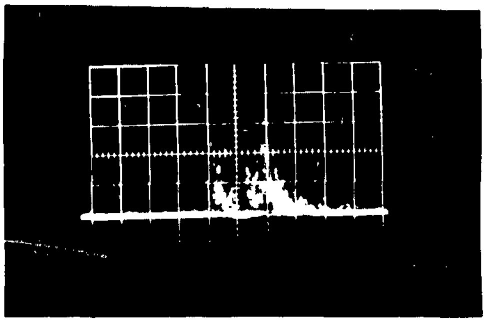
Second Harmonic 2634.9 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B



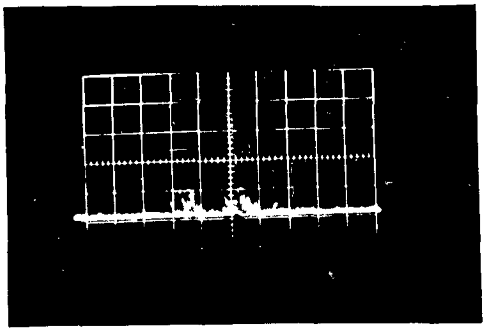
Second Harmonic 2634.9 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



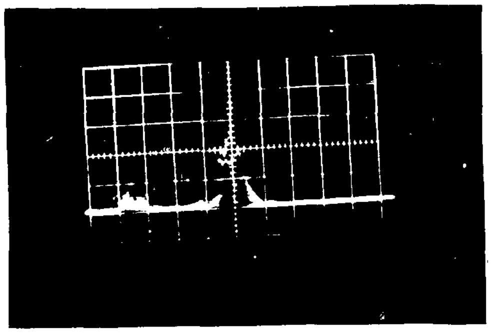
Spurious Frequency 3011.5 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Polarad FIM Model B



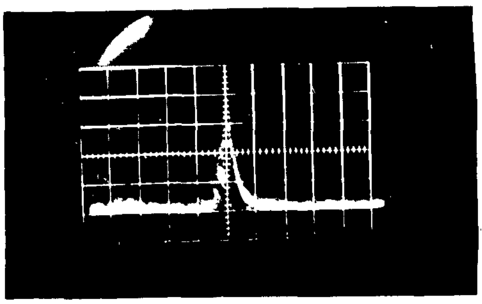
Spurious Frequency 3011.5 mc
Horiz - 2 usec/cm
Vert - 0.1 volts/cm
Empire Devices NF112



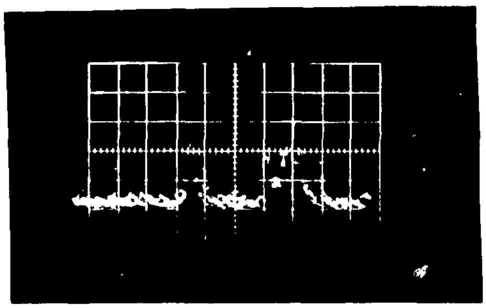
Spurious Frequency 3011.5 mc
Horiz - 2 usec/cm
Vert - 0.1 volts/cm
Empire Devices NF112 with
Pre-selector



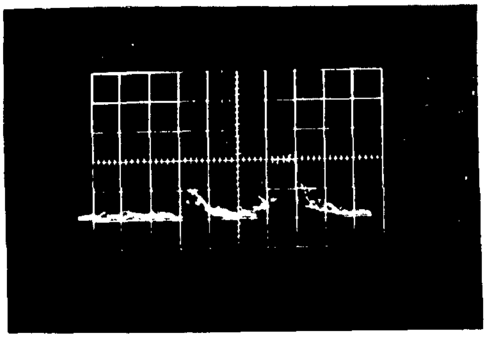
Spurious Frequency 3111.0 mc
Horiz - 1 usec/cm
Vert - 0.2 volts/cm
Empire Devices NF112



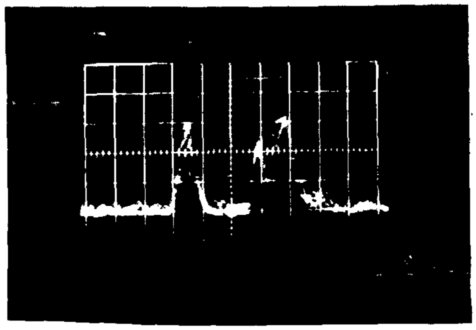
Spurious Frequency 3111.0 mc
Horiz- 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



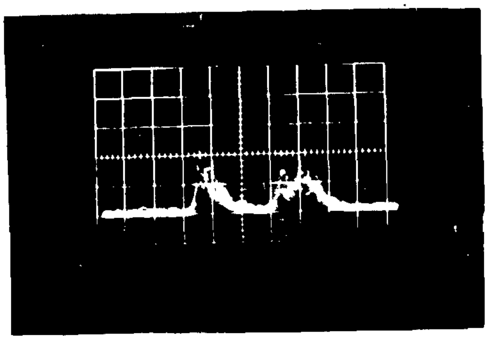
Spurious Frequency 3356.0 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Empire Devices NF112 with
Pre-selector



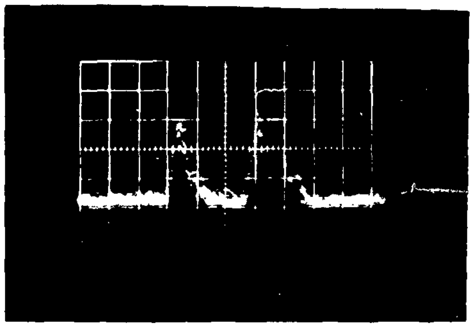
Spurious Frequency 3356.0 mc
Horiz - 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



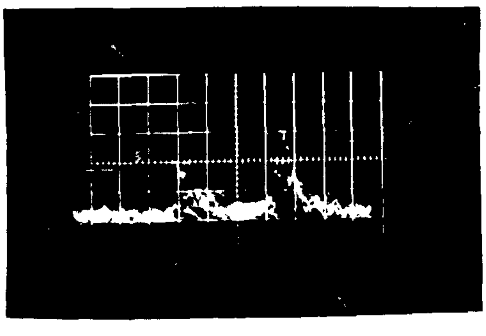
Spurious Frequency 3356.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



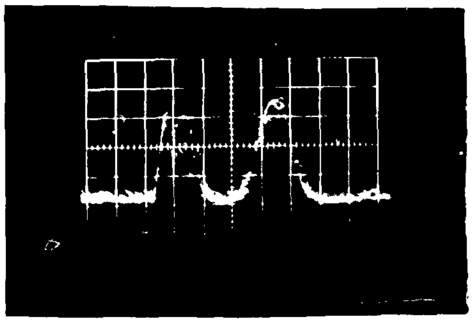
Spurious Frequency 3422.0 mc
Horiz - 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



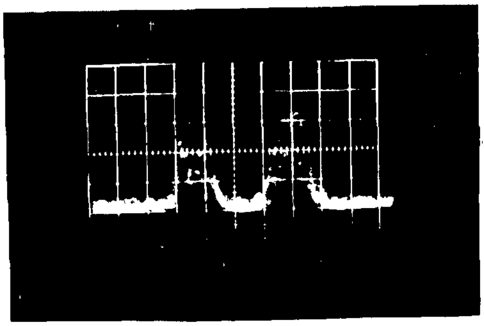
Spurious Frequency 3422.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



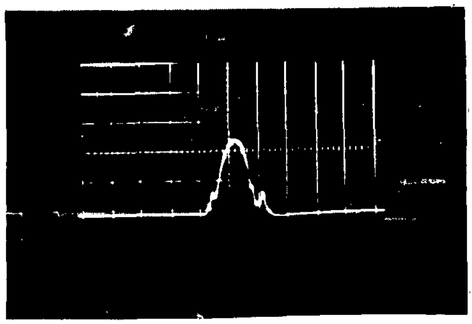
Spurious Frequency 3485.0 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Polarad FIM Model B



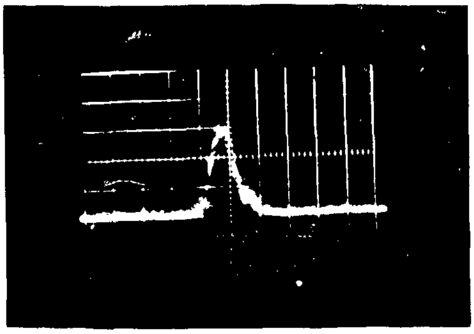
Spurious Frequency 3485.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



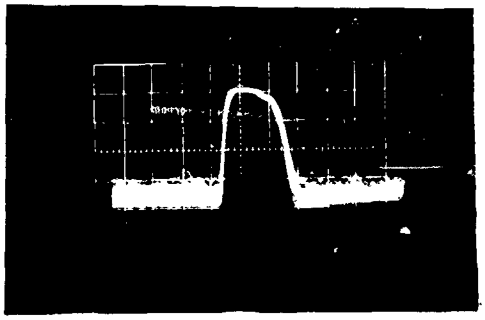
Spurious Frequency 3485.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112 with preselector



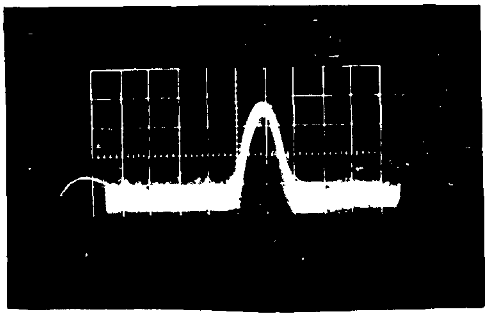
Third Harmonic 3949.5 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



Third Harmonic 3949.5 mc
Horiz - 2 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



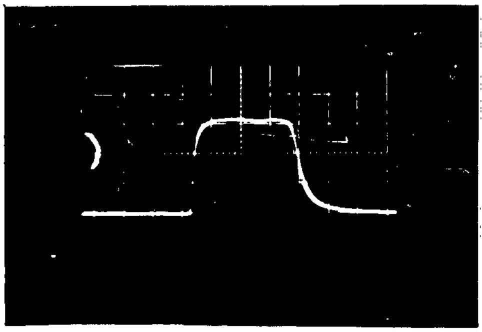
Fourth Harmonic 5264.4 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



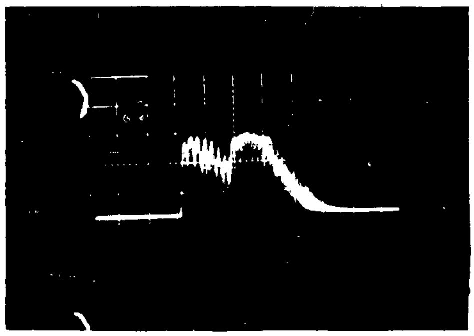
Fifth Harmonic 6670.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112

(C) High Test Frequency 1346.5 mc Date 19 May 1962

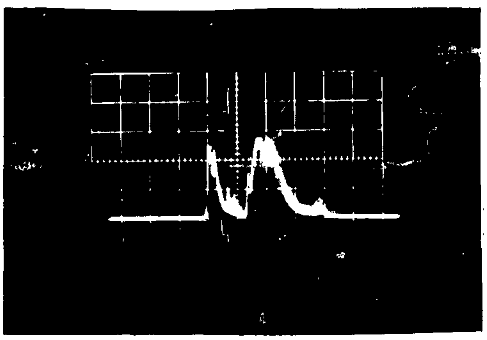
(1) Nominal Pulse Width - 3 usec
Pulse Repetition Frequency - 360 pps
Oscilloscope Setting and the FIM used in taking the picture are indicated under each photograph.



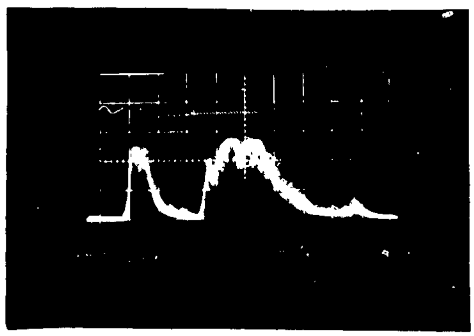
Fundamental Frequency 1346.5 mc
Horiz - 1 usec/cm
Vert - 5 volts/cm
Polarad FIM - Model B



Spurious Frequency 1132.2 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM - Model B

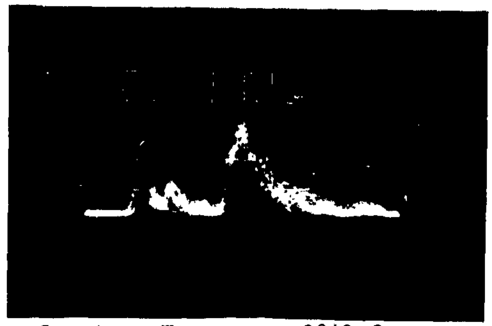


Spurious Frequency 1531.2 mc
Horiz - 2 usec/cm
Vert - 10 volts/cm
Polarad FIM - Model B

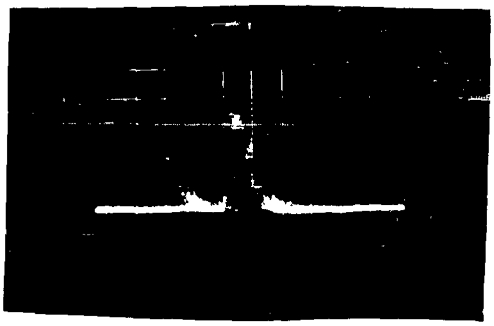


Spurious Frequency 1531.2 mc
Horiz - 1 usec/cm
Vert - 10 volts/cm
Polarad FIM- Model B

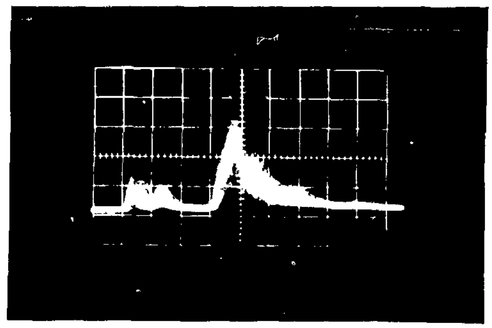
Spurious frequency 1841.0 mc
Horiz - 1 usec/cm
Vert - 10 volts/cm
Polarad FIM-Model B



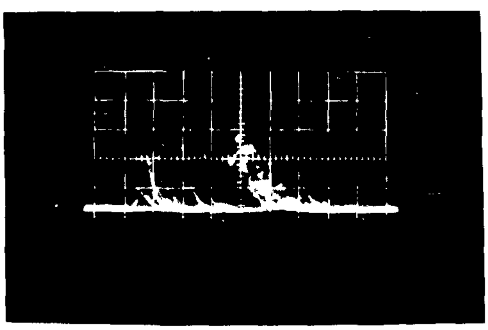
Spurious Frequency 2049.3 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices - NF112



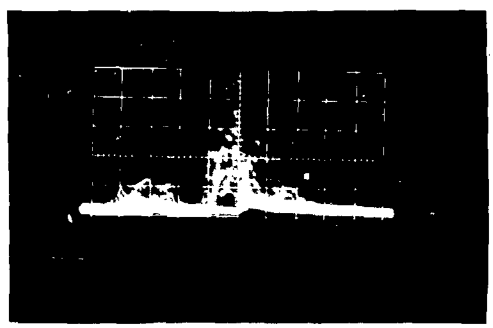
Spurious Frequency 2049.3 mc
Horiz - 1 usec/cm
Vert - 0.5 Volts/cm
Empire Devices NF112



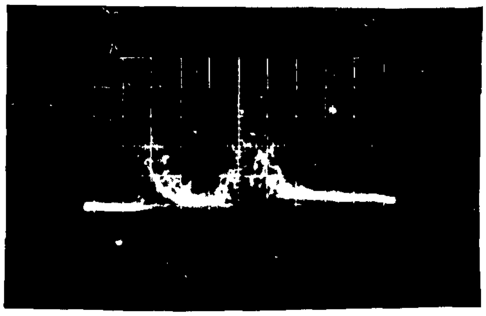
Spurious Frequency 2049.3 mc
Horiz - 1 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



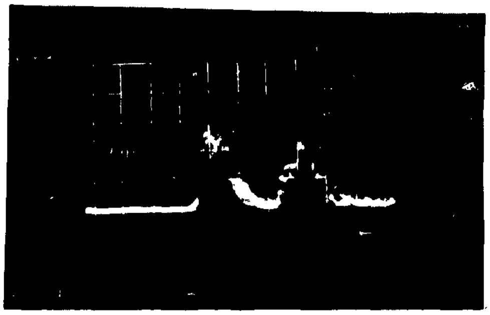
Spurious Frequency 2315.5 mc
Horiz - 1 usec/cm
Vert - 0.2 volts/cm
Empire Devices NF112



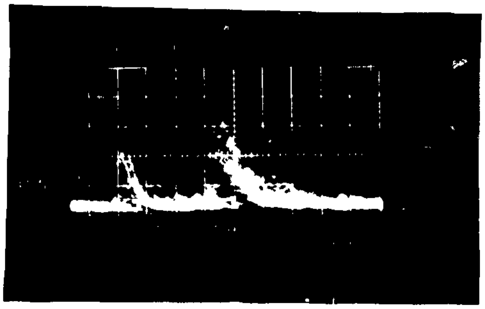
Spurious Frequency 2315.5 mc
Horiz - 1 usec/cm
Vert - 1 volts/cm
Polarad FIM Model B



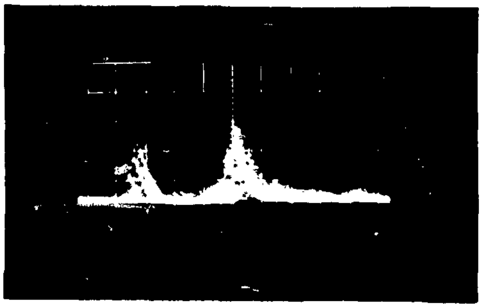
Spurious Frequency 2470.0 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Polarad FIM Model B



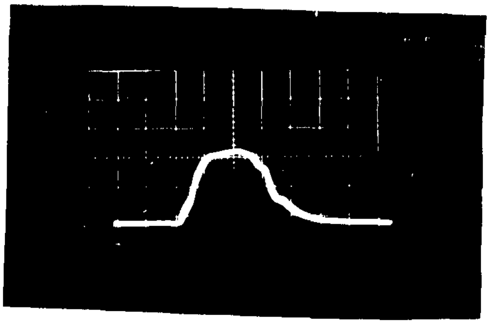
Spurious Frequency 2470.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



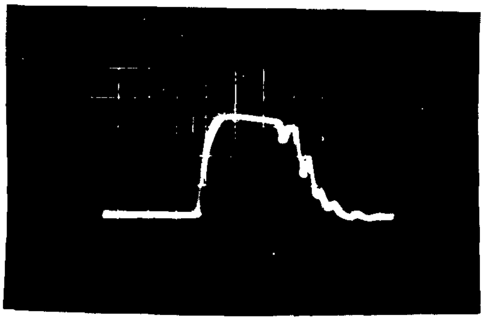
Spurious Frequency 2546.0 mc
Horiz - 1 usec/cm
Vert - 2 volts/cm
Polarad FIM Model B



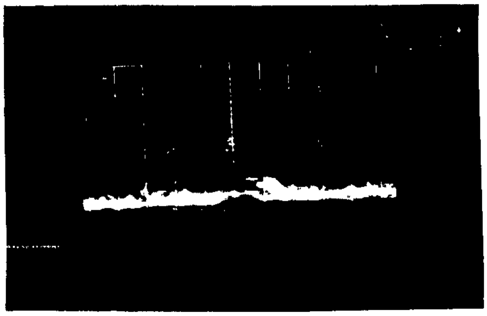
Spurious Frequency 2546.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



Second Harmonic 2693.5 mc
Horiz - 1 usec/cm
Vert - 10 volts/cm
Polarad FIM Model B

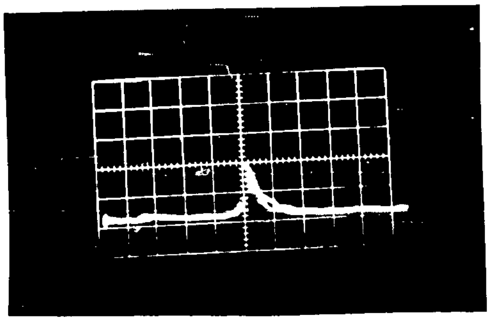


Second Harmonic 2693.5
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112

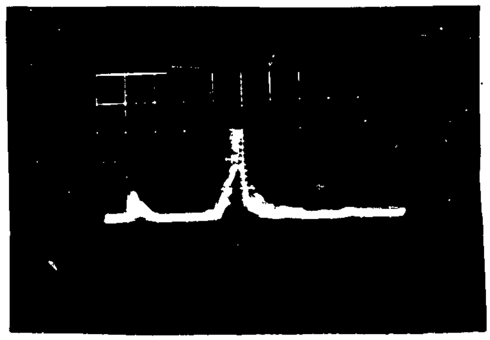


Spurious Frequency 3039.0 mc
Horiz - 1 usec/cm
Vert - 1 volt/cm
Polarad FIM Model B

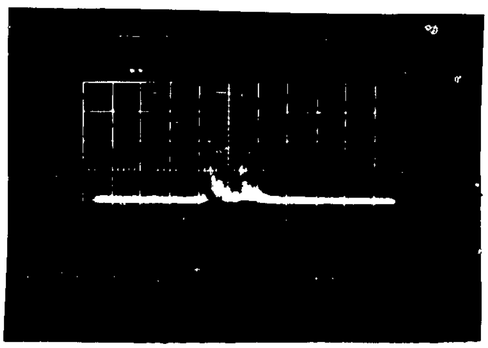
Spurious Frequency 3039.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



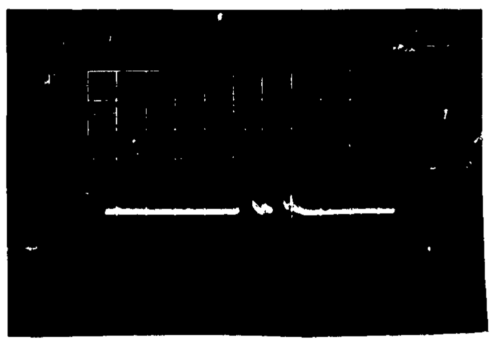
Spurious Frequency 3181.0 mc
Horiz - 1 usec/cm
Vert - 5 volt/cm
Polarad FIM Model B



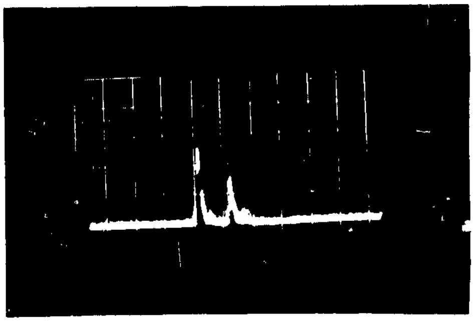
Spurious Frequency 3180.0 mc
Horiz - 1 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



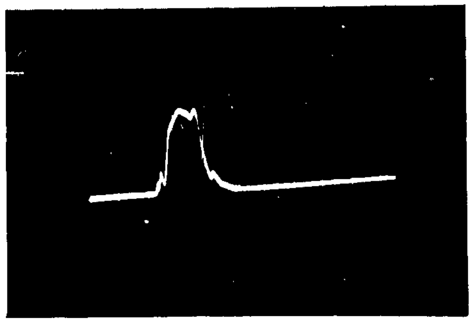
Spurious Frequency 3495.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Polarad FIM Model B



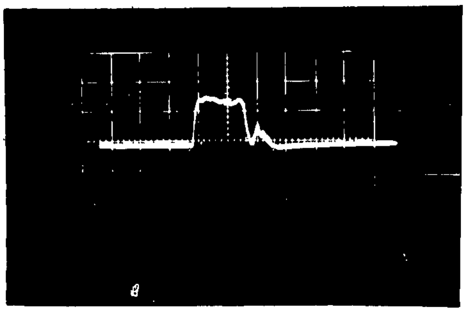
Spurious Frequency 3495.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112



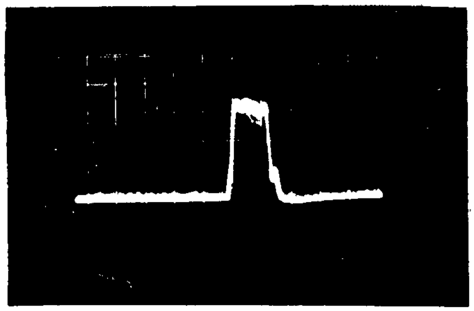
Spurious Frequency 3495.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112 with
Pre-selector



Third Harmonic 4039.5 mc
Horiz - 2 usec/cm
Vert - 5 volts/cm
Polarad FIM Model B



Third Harmonic 4039.5 mc
Horiz - 2 usec/cm
Vert - 1 volt/cm
Empire Devices NF112



Fourth Harmonic 5386.0 mc
Horiz - 2 usec/cm
Vert - 0.5 volts/cm
Empire Devices NF112

3.2.6 <u>Intermodulation</u> This test is not required of pulse type transmitters.

3.2.7 <u>Modulator Bandwidth</u> This test is not required of pulse type transmitters.

3.2.8 <u>Carrier Frequency Stability Test</u>

3.2.8.1 <u>General</u> The purpose of this test is to determine transmitter frequency stability.

3.2.8.2 <u>Measurement Setup</u> The test setup is shown in figure 3.2.2. The frequency output of the transmitter was monitored at the direct output coupler with a transfer oscillator and frequency counter.

3.2.8.3 <u>Procedure</u>

(a) The transmitter filaments were turned on approximately thirty (30) minutes before the magnetron was fired.

(b) The magnetron was fired and the frequency measured and reset to a standard test frequency.

(c) Fifteen (15) minutes later the frequency was again measured with the transfer oscillator and frequency counter.

(d) The frequency was measured every fifteen (15) minutes for four (4) hours.

3.2.8.4 <u>Remarks</u>

(a) The environment of the radar system was a building normally maintained at approximately 70° F.

(b) The test was repeated at all test frequencies whereas the DODMCPSS called for only the mean test frequency.

3.2.8.5 **Data** **Date** 26 April 1962

Table I

Low Test Frequency

Time		Frequency
0115		Turn on for warm up
0145	Fired Magnetron-	1284.485520
0200		1285.800372
0215		1286.746413
0230		1287.320757
0245		1287.950644
0300		1288.326543
0315		1288.388276
0330		1288.334729
0345		1288.494885
0400		1288.386721
0415		1288.489837
0430		1288.510984
0445		1288.565408
0500		1288.579816
0515		1288.447837
0530		1288.560066
0545		1288.537764
0600		1288.527403

Table II **Date** 3 May 1962

Mean Test Frequency

Time		Frequency
0010		Turn on for warm up
0045	Fired Magnetron-	1299.771462
0100		1316.145961
0115		1316.973268
0130		1317.724394
0145		1318.107563
0200		1318.584799
0215		1318.503832
0230		1318.631856
0245		1318.637245
0300		1318.581239
0315		1318.657458
0330		1318.600025
0345		1318.618677
0400		1318.598598
0415		1318.588971
0430		1318.589396
0445		1318.585190
0500		1318.530606

3.2.8.5 **Data** Date 27 April 1962

Table III

High Test Frequency

Time		Frequency
0015		Turn on for warm up
0045	Fired Magnetron-	1342.604976
0100		1343.952222
0115		1346.184386
0130		1347.213078
0145		1347.808534
0200		1348.093600
0215		1348.208840
0230		1348.304453
0245		1348.361756
0300		1348.391873
0315		1348.400637
0330		1348.312848
0345		1348.347301
0400		1348.379886
0415		1348.349253
0430		1348.349773
0445		1348.418346
0500		1348.446108
0515		1348.395673
0530		1348.356057
0545		1348.380193

PART III

Receiver Testing

3.3 Receiver Measurements

3.3.1 General Requirements All measurements in this section are in dbm, wherever practical.

3.3.2 Modulation The receiver measurements were performed using a 3.0 microsecond pulse width at a PRF of 360 pulses per second, unless otherwise specified in the individual measurement procedures.

3.3.3 Standard Response The standard response used in the receiver measurements was a minimum visible signal (MVS) except a mid-pulse minimum visible signal (MP-MVS) was used for wide pulses.

3.3.4 Sensitivity

3.3.4.1 General Since the sensitivity of a receiver may vary considerably over the desired frequency range, it is the purpose of this test to measure the sensitivity and establish any deviations in sensitivity that may exist.

3.3.4.2 Measurement Setup The Test setup for the receiver sensitivity is shown in figure 3.3.4 for both MTI and NORMAL receiver. The system sync was used to synchronize the receiver, indicator and signal generator. A Frequency Meter (Polytechnic FR-49(XW-3)/U) having an accuracy of .01%, was used to initially set the receiver to the standard test frequencies.

3.3.4.3 Procedure

(a) The signal generator was adjusted to simulate the normal modulation characteristics of the system under test.

(b) The receiver was tuned to five spaced frequencies of its tuning range corresponding to the 5%, 25%, 50%, 75% and 95% points of its tuning range.

(c) The standard response (MVS) was measured and recorded at each of the five frequency points.

3.3.4.4 **Data**

NORMAL RECEIVER — Date 21 February 1962

Band L

Receiver Frequency (mc)	Power Input (dbm)
1283.2	-104
1297.1	-105
1315.0	-107
1332.0	-110
1347.0	-108

MTI RECEIVER — Date 22 March 1962

Band L

Receiver Frequency (md)	Power Input (dbm)
1283.2	-99.5
1297.0	-91.5
1315.5	-99.5
1332.5	-96.5
1346.5	-101.5

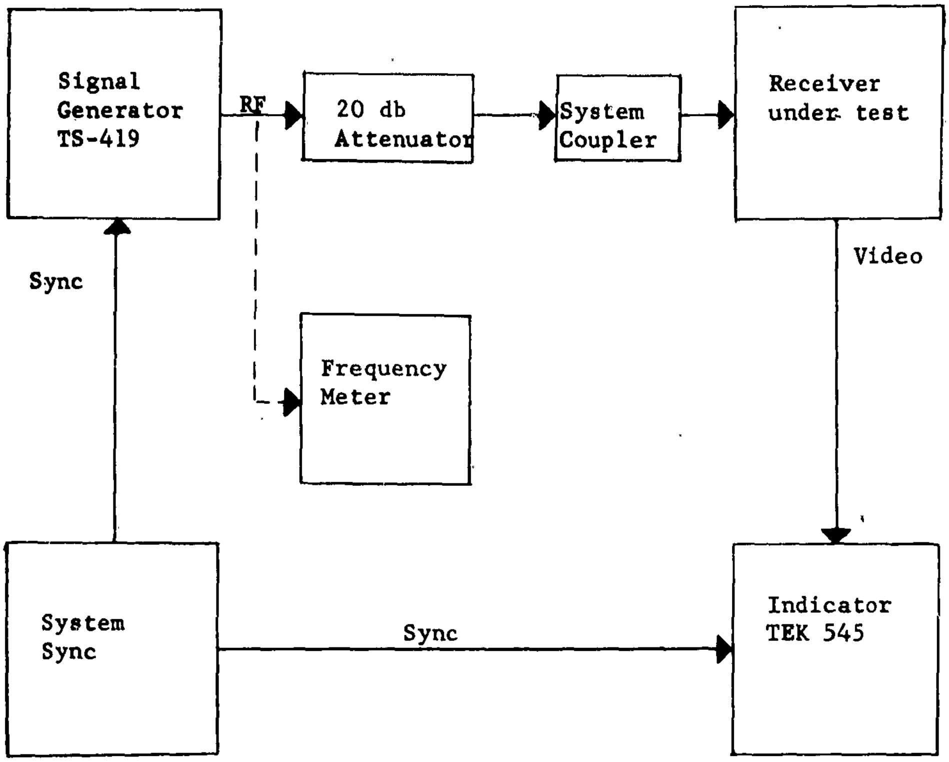


Figure 3.3.4 Sensitivity Test Set-up

3.3.5 Selectivity

3.3.5.1 General The selectivity as measured by this test gives an indication of the overall gain and sensitivity at the receiver center tuned frequency, as well as the response at frequencies slightly removed from the center tuned frequency. The response characteristic is determined by the IF amplifier tuned circuits and should be fairly symmetrical about the center frequency. The selectivity curve of the receiver can be determined by measuring several points, for example, the 3, 6, 20, 40 and 60 decibel frequency points on both sides of the receiver center frequency.

3.3.5.2 Modulation The selectivity test was run at the modulation characteristics of 360 PRF and pulse widths of 1.5, 3, 6, 9, 15, and 30 microseconds.

3.3.5.3 Measurement Setup The selectivity test setup is shown in Figure 3.3.5 for both NORMAL and MTI receivers. The system sync was used to sync the signal generator to the indicator scope. A transfer oscillator and a frequency counter was used to obtain the accuracy of 1 part per 10^6.

3.3.5.4 Procedure

(a) The receiver and signal generator were tuned to a standard test frequency and standard response (MVS) obtained.

(b) The frequency was measured with the transfer oscillator and frequency counter.

(c) The signal power was increased 3 db from the standard response and the signal frequency increased above the center frequency until the standard response (MVS) was obtained.

3.3.5.4 Procedure (Continued)

(d) The signal frequency was measured and recorded as the upper 3 db point of the selectivity curve.

(e) The signal frequency was decreased through center frequency until the standard response (MVS) was again obtained.

(f) The signal frequency was measured and recorded as the lower 3 db point.

(g) This was repeated at the standard test frequencies for the 6, 20, 40 and 60 db points. Sets of curves were plotted at the different pulse widths listed in 3.3.5.2.

3.3.5.5 Remarks

(a) It was noticed that the receiver frequency drifted between selectivity measurements.

(b) The first complete count of the frequency counter was used to eliminate as much drift in the transfer oscillator as possible.

(c) The NORMAL and MTI standard response was found to change daily as much as 3 or 4 db. This may have been caused by the number of organizations working on the radar system in a 24 hour day. Each measurement taken has the standard response (MVS) recorded at that date. The response would remain consistent throughout a working period of 8 hours.

(d) A mid-pulse minimum visable signal (MPMVS) was used as a standard response for wide pulse widths.

3.3.5.6 Data

NORMAL RECEIVER **Date** 2 May 1962

Band L

Table I Low Test Frequency

Receiver Tuned Frequency (mc) 1283.440348

Standard Response (MVS) -93 dbm

Pulse Width 1.5 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	1172.632	1059.206	2231.838
6	1303.740	1474.268	
20	4069.360	3476.101	
40	11213.628	7934.080	
60	19532.948	16379.408	

Date 1 May 1962

Receiver Tuned Frequency (mc) 1282.961454

Standard Response (MVS) -100 dbm

Pulse Width 3 usec (nominal)

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	959.166	1046.077	2005.243
6	1657.296	1410.920	
20	4369.671	2550.774	
40	10990.929	7186.176	
60	19124.510	15751.971	

3.3.5.6 Normal Receiver (Continued) Date 1 May 1962

Receiver Tuned Frequency (mc) 1283.284776

Standard Response (MVS) -106 dbm

Pulse Width 6 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	768.994	808.430	1577.424
6	945.899	1015.666	
20	2709.670	1871.284	
40	7759.996	5565.560	
60	16687.370	12456.170	

Date 1 May 1962

Receiver Tuned Frequency (mc) 1283.323735

Standard Response (MVS) -106 dbm

Pulse Width 9 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	1022.020	393.825	1415.845
6	1161.237	824.873	
20	2253.732	1405.031	
40	6855.653	5329.550	
60	15826.741	11603.090	

Date 2 May 1962

Receiver Tuned Frequency (mc) 1283.545358

Standard Response (MVS) -102 dbm

Pulse Width 15 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	524.185	612.154	1136.339
6	713.476	868.411	
20	1723.942	1564.178	
40	7478.837	5075.928	
60	15823.594	11159.254	

3.3.5.6 Normal Receiver (Continued) Date 2 May 1962

Receiver Tuned Frequency (mc) 1283.289102

Standard Response (MVS) -101 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	1251.344	587.177	1838.521
6	1929.072	794.032	
20	3671.804	1860.842	
40	7578.193	5863.602	
60	15860.755	12157.327	

Table II Mean Test Frequency Date 1 May 1962

Receiver Tuned Frequency (mc) 1316.269207

Standard Response (MVS) -97 dbm

Pulse Width 1.5 usec

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	916.700	1140.349	2057.049
6	1291.209	1552.145	
20	2883.113	1937.373	
40	8298.733	7637.294	
60	17658.863	16303.694	

Date 30 April 1962

Receiver Tuned Frequency (mc) 1316.093960

Standard Response (MVS) -107 dbm

Pulse Width 3 usec (Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	307.540	468.228	775.768
6	638.211	775.726	
20	1772.414	1792.146	
40	6475.833	4910.867	
60	14173.236	11323.523	

3.3.5.6 Normal Receiver (Continued) Date 30 April 1962

Receiver Tuned Frequency (mc) 1316.147423

Standard Response (MVS) -107 dbm

Pulse Width 6 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	731.380	571.205	1302.585
6	776.351	1090.403	
20	2022.758	1494.121	
40	5998.295	5353.363	
60	14176.390	10299.768	

Date 30 April 1962

Receiver Tuned Frequency (mc) 1316.031474

Standard Response (MVS) -107 dbm

Pulse Width 9 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	453.000	147.267	600.267
6	691.357	328.650	
20	1275.092	1278.637	
40	5066.611	3460.571	
60	12739.848	9139.676	

Date 30 April 1962

Receiver Tuned Frequency (mc) 1316.209127

Standard Response (MVS) -107 dbm

Pulse Width 15 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	407.721	569.529	977.250
6	1010.444	991.432	
20	2477.916	1724.092	
40	6914.264	5681.679	
60	13772.768	11139.381	

3.3.5.6 Normal Receiver (Continued) Date 1 May 1962

Receiver Tuned Frequency (mc) 1316.018644

Standard Response (MVS) -107 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	560.556	172.540	773.096
6	720.601	370.587	
20	3152.553	1128.643	
40	4040.660	3314.890	
60	13043.306	9274.456	

Table III High Test Frequency Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.735160

Standard Response (MVS) -97 dbm

Pulse Width 1.5 usec

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	695.723	1138.250	1833.973
6	1180.771	1641.268	
20	2943.164	2340.207	
40	9276.034	8215.142	
60	17526.071	16287.225	

Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.919496

Standard Response (MVS) -98 dbm

Pulse Width 3 usec (Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	575.436	1384.276	1959.712
6	884.474	1479.645	
20	3028.468	4594.205	
40	8892.674	8925.644	
60	18001.378	16772.233	

3.3.5.6 Normal Receiver (Continued) Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.284215

Standard Response (MVS) -107 dbm

Pulse Width 6 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	345.955	515.971	861.926
6	778.108	616.492	
20	2394.700	2148.588	
40	6280.533	5723.157	
60	14070.186	11819.928	

Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.230537

Standard Response (MVS) -106.5 dbm

Pulse Width 9 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	165.473	1006.231	1171.704
6	781.016	1584.657	
20	2028.378	3951.300	
40	6862.913	5068.665	
60	15212.076	11702.856	

Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.310284

Standard Response (MVS) -110 dbm

Pulse Width 15 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	460.208	707.188	1167.396
6	757.099	828.119	
20	1910.911	1732.403	
40	6818.854	5273.448	
60	14790.388	11835.460	

3.3.5.6 Normal Receiver (Continued) Date 1 May 1962

Receiver Tuned Frequency (mc) 1346.307265

Standard Response (MVS) -109 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	398.349	637.617	1035.966
6	565.570	774.733	
20	3171.766	1544.740	
40	6125.382	6580.440	
40	14557.548	12288.558	

3.3.5.6 **Data** (Continued)

MTI RECEIVER **Date** 2 May 1962

Table I Low Test Frequency

Receiver Tuned Frequency (mc) 1283.536974

Standard Response (MVS) -91 dbm

Pulse Width 1.5 usec

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	609.473	1593.361	2202.834
6	773.799	1613.662	
20	1963.008	2184.954	
40	7398.637	6259.798	
60	16684.608	14734.714	

Date 2 May 1962

Receiver Tuned Frequency (mc) 1283.212370

Standard Response (MVS) -101 dbm

Pulse Width 3.0 usec (Nominal)

Relative Response (db)	$+\Delta f$ (kc)	$-\Delta f$ (kc)	Bandwidth (kc)
3	463.388	288.959	752.347
6	727.515	645.886	
20	1824.054	1268.322	
40	6078.212	3337.444	
60	13538.738	10526.280	

3.3.5.6 **MTI Receiver** (Continued) **Date** 1 May 1962

Receiver Tuned Frequency (mc) 1283.568752

Standard Response (MVS) -100 dbm

Pulse Width 6 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	148.621	435.386	584.007
6	564.733	747.057	
20	1469.666	1211.667	
40	7541.572	3736.987	
60	16268.645	13020.159	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1283.586223

Standard Response (MVS) -100 dbm

Pulse Width 9 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	196.440	442.978	639.418
6	301.251	711.453	
20	1293.337	1530.027	
40	6382.567	4018.161	
60	14248.755	10347.805	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1283.325642

Standard Response (MVS) -101 dbm

Pulse Width 15 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	191.122	408.235	599.357
6	605.939	822.459	
20	1594.494	1449.159	
40	7544.684	5370.667	
60	15849.311	11013.410	

3.3.5.6 MTI Receiver (Continued) Date 3 May 1962

Receiver Tuned Frequency (mc) 1283.269212

Standard Response (MVS) -101 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	394.396	488.475	882.871
6	1674.495	728.865	
20	3207.745	1807.022	
40	6732.633	5417.512	
60	15620.969	11131.864	

Table II Mean Test Frequency Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.482650

Standard Response (MVS) -90 dbm

Pulse Width 1.5 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	1175.567	1492.153	2667.720
6	1631.624	2014.216	
20	4044.733	3038.648	
40	11010.440	9175.673	
60	19534.382	15526.243	

3.3.5.6 MTI Receiver (Continued) Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.179621

Standard Response (MVS) -103 dbm

Pulse Width 3 usec (Nominal)

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	386.822	608.417	995.239
6	443.044	676.730	
20	1817.021	1079.183	
40	5718.003	3257.476	
60	15851.919	10516.207	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.302501

Standard Response (MVS) -106 dbm

Pulse Width 6 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	279.013	469.031	748.044
6	428.635	507.063	
20	1216.369	1159.899	
40	5730.765	4617.276	
60	15171.965	9577.260	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.237754

Standard Response -108 dbm

Pulse Width 9 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	306.808	361.346	668.154
6	354.784	380.236	
20	1041.967	1133.173	
40	5882.739	3579.093	
60	13322.088	9981.940	

3.3.5.6 MTI Receiver (Continued) Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.211073

Standard Response (MVS) -108 dbm

Pulse Width 15 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	344.177	279.586	623.763
6	375.758	472.961	
20	1301.402	1160.851	
40	6518.092	5148.801	
60	13658.639	9377.809	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1315.219641

Standard Response (MVS) -109 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	265.384	381.416	646.800
6	439.080	568.879	
20	2090.301	1172.111	
40	5892.961	4426.149	
60	14129.054	11236.688	

Table III High Test Frequency Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.720732

Standard Response (MVS) -94 dbm

Pulse Width 1.5 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	1131.355	747.166	1878.521
6	1339.718	1421.099	
20	3309.980	3414.279	
40	11134.294	8950.228	
60	21759.499	16798.542	

3.3.5.6 MTI Receiver (Continued) Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.433766

Standard Response (MVS) -105 dbm

Pulse Width 3 usec (Nominal)

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	499.354	287.148	786.502
6	828.839	758.136	
20	2242.579	1342.525	
40	9354.921	5777.653	
60	16815.866	12007.025	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.583196

Standard Response (MVS) -106 dbm

Pulse Width 6 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	395.125	447.436	842.561
6	643.376	549.699	
20	2095.137	1927.074	
40	8423.317	5302.963	
60	15439.060	11166.419	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.489010

Standard Response (MVS) -106 dbm

Pulse Width 9 usec

Relative Response (db)	+△f (kc)	-△f (kc)	Bandwidth (kc)
3	429.306	285.492	714.798
6	540.108	816.197	
20	1620.931	1274.782	
40	6609.827	5624.840	
60	15388.877	12330.395	

3.3.5.6 MTI Receiver (Continued) Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.514958

Standard Response (MVS) -107 dbm

Pulse Width 15 usec

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	332.345	257.138	589.483
6	431.758	475.225	
20	1449.219	1302.194	
40	5779.259	5023.345	
60	15108.529	10487.931	

Date 3 May 1962

Receiver Tuned Frequency (mc) 1346.504480

Standard Response (MVS) -107 dbm

Pulse Width 30 usec (10 X Nominal)

Relative Response (db)	+Δf (kc)	-Δf (kc)	Bandwidth (kc)
3	403.226	391.459	794.685
6	937.652	612.780	
20	2011.846	1603.939	
40	7803.178	5170.950	
60	13296.293	10026.786	

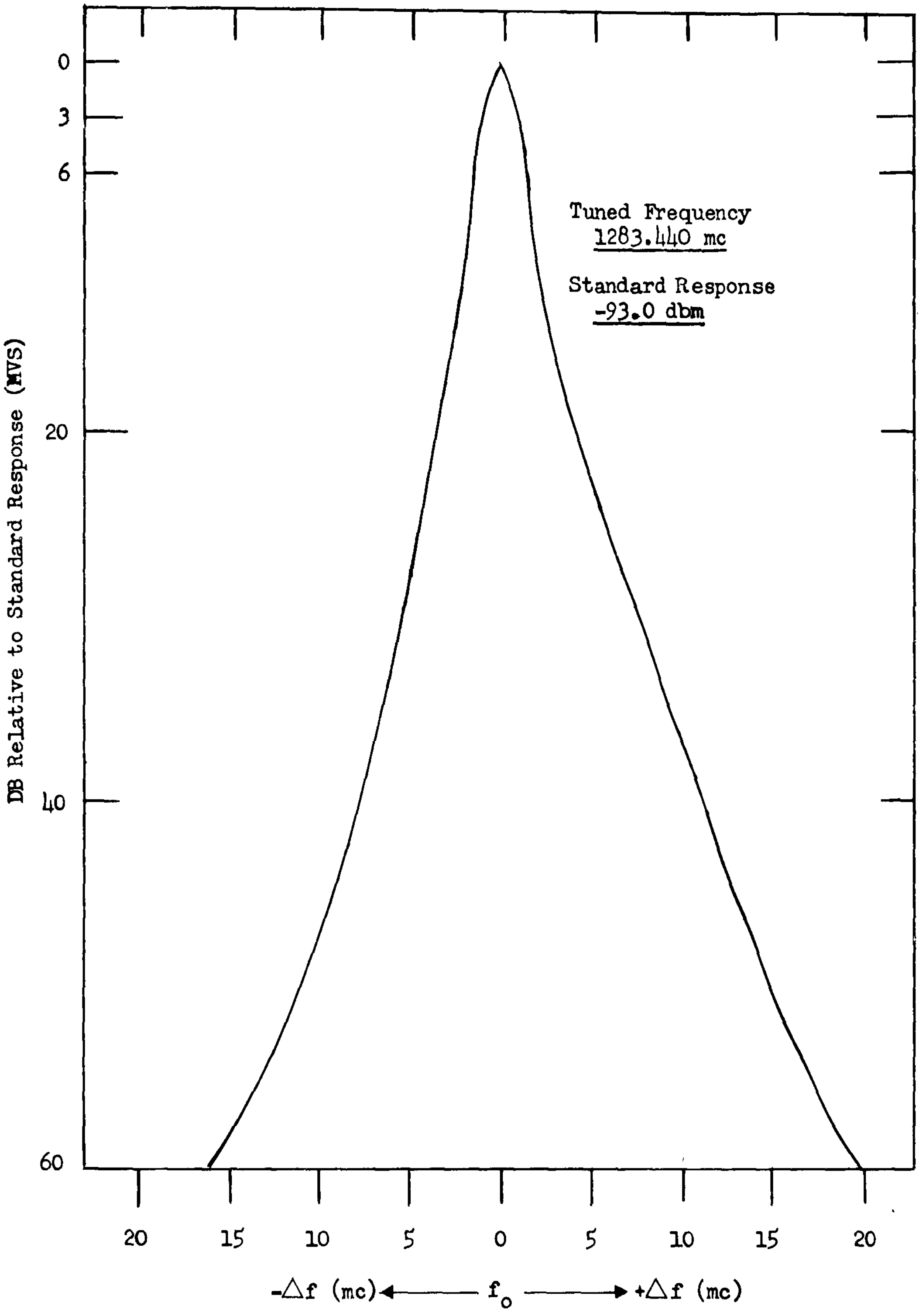


Figure 3.3.5.1 Normal Receiver Selectivity Curve -1.5 usec Pulse

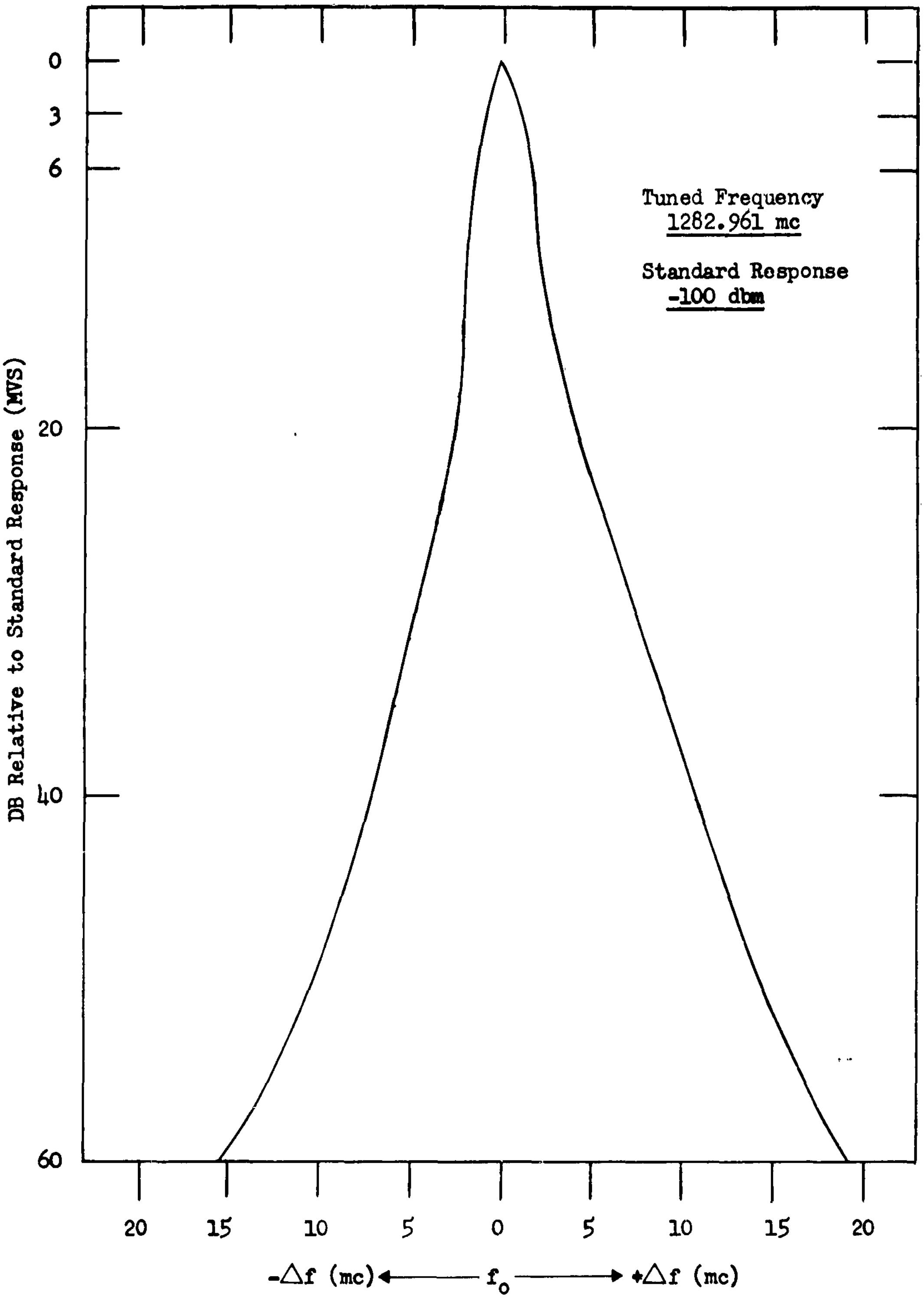


Figure 3.3.5.2 Normal Receiver Selectivity Curve - 3.0 usec Pulse

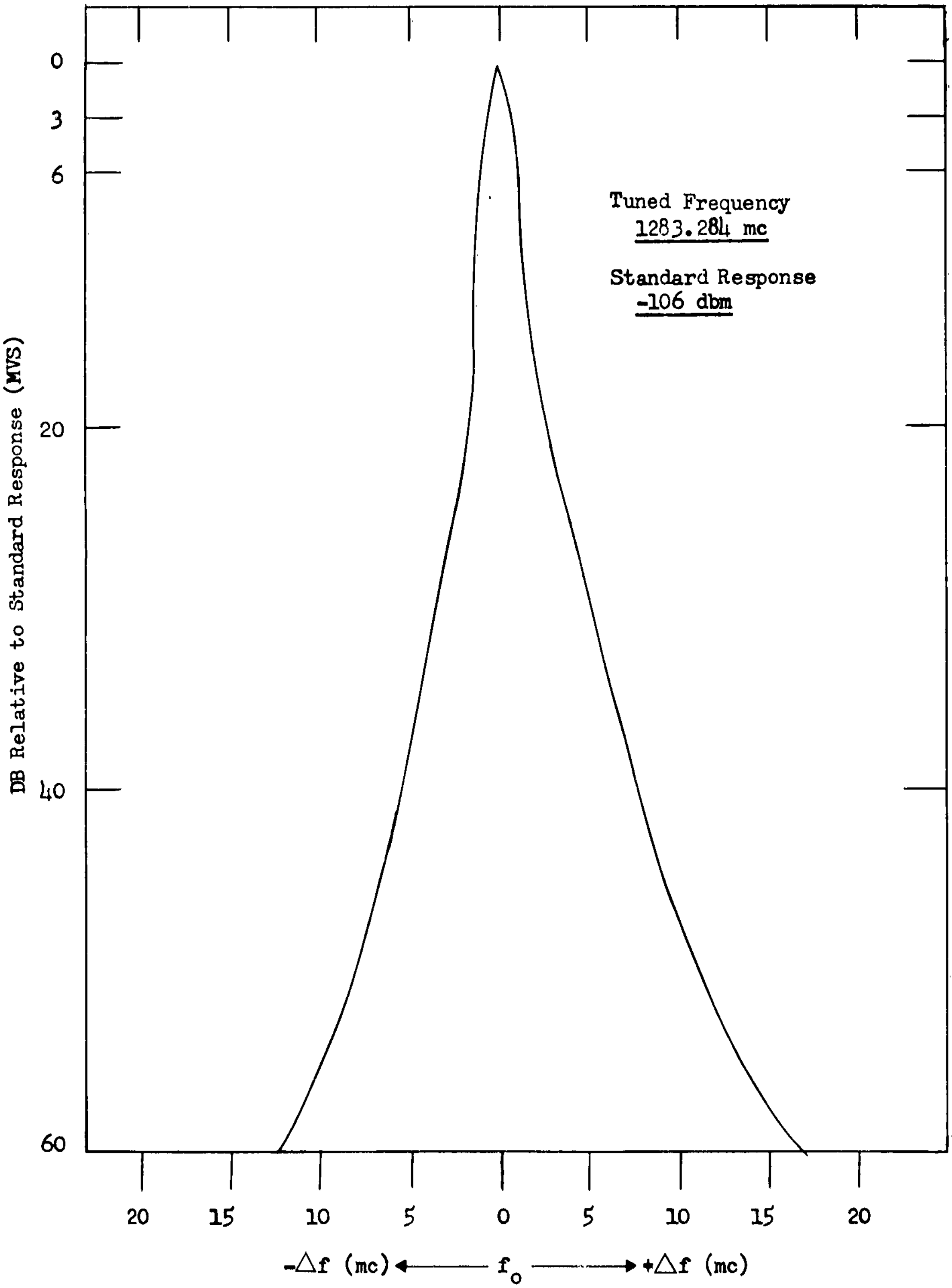


Figure 3.3.5.3 Normal Receiver Selectivity Curve - 6.0 usec Pulse

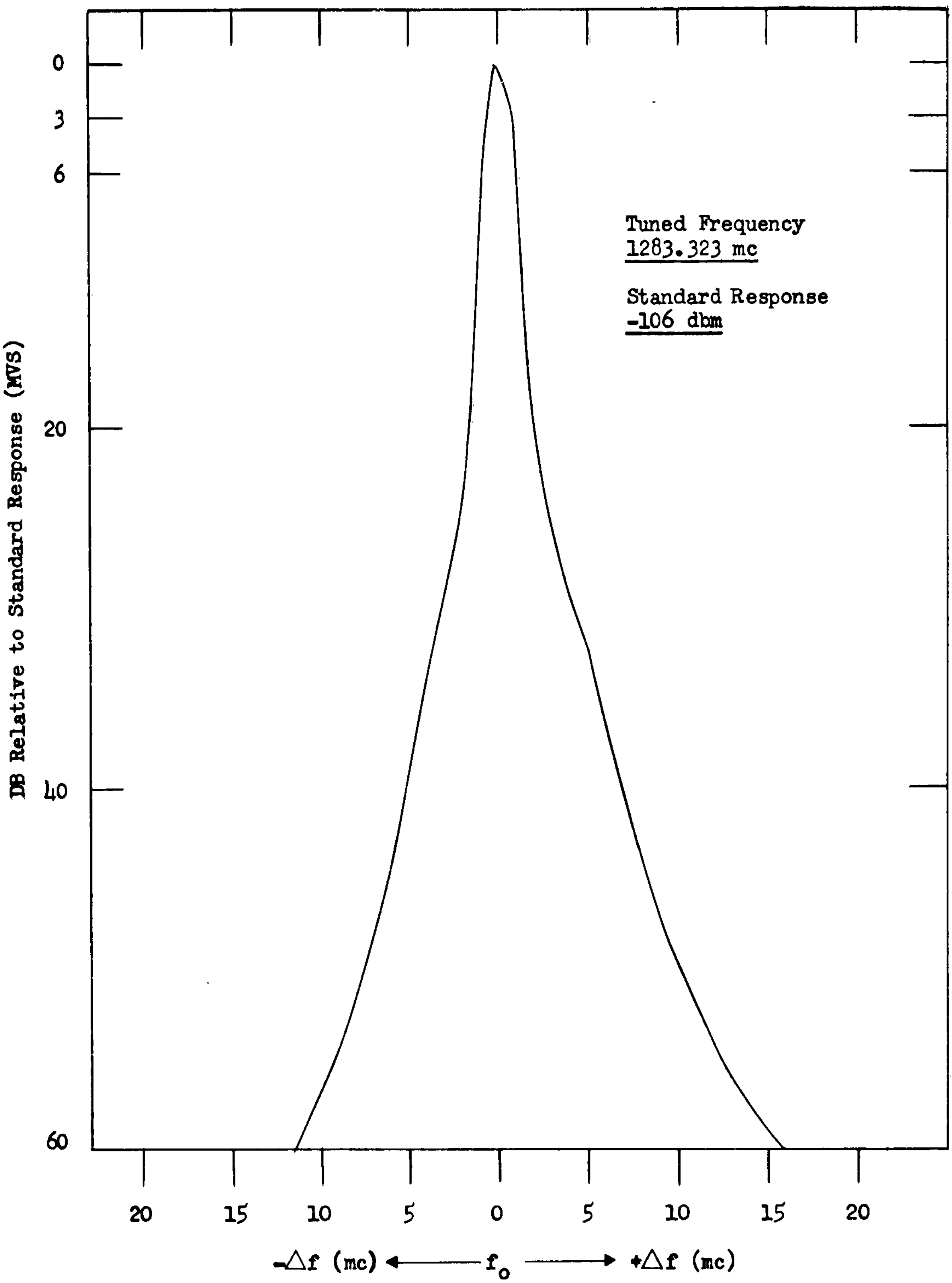


Figure 3.3.5.4 Normal Receiver Selectivity Curve - 9.0 usec Pulse

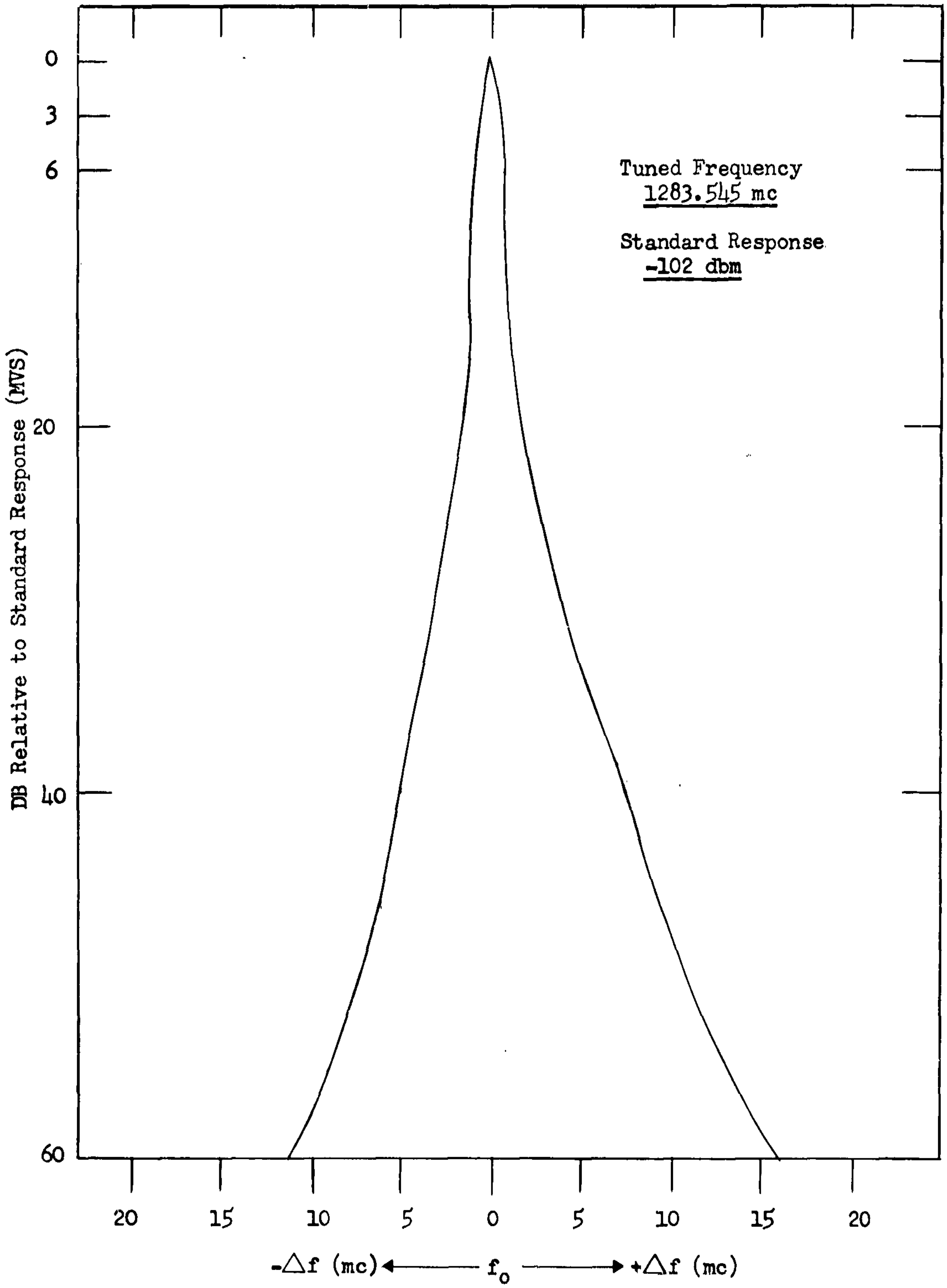


Figure 3.3.5.5 Normal Receiver Selectivity Curve - 15.0 usec Pulse

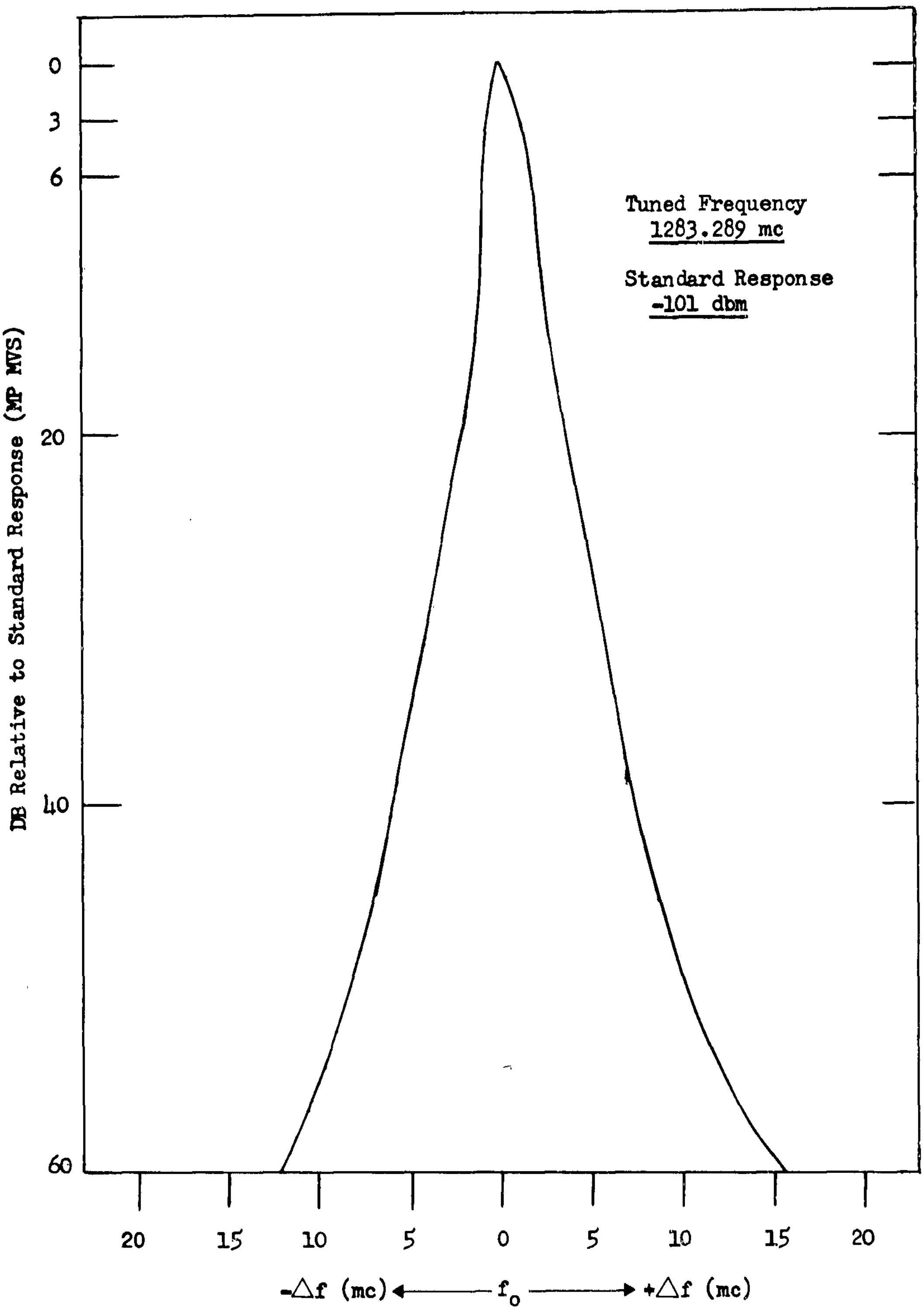


Figure 3.3.5.6 Normal Receiver Selectivity Curve - 30.0 usec Pulse

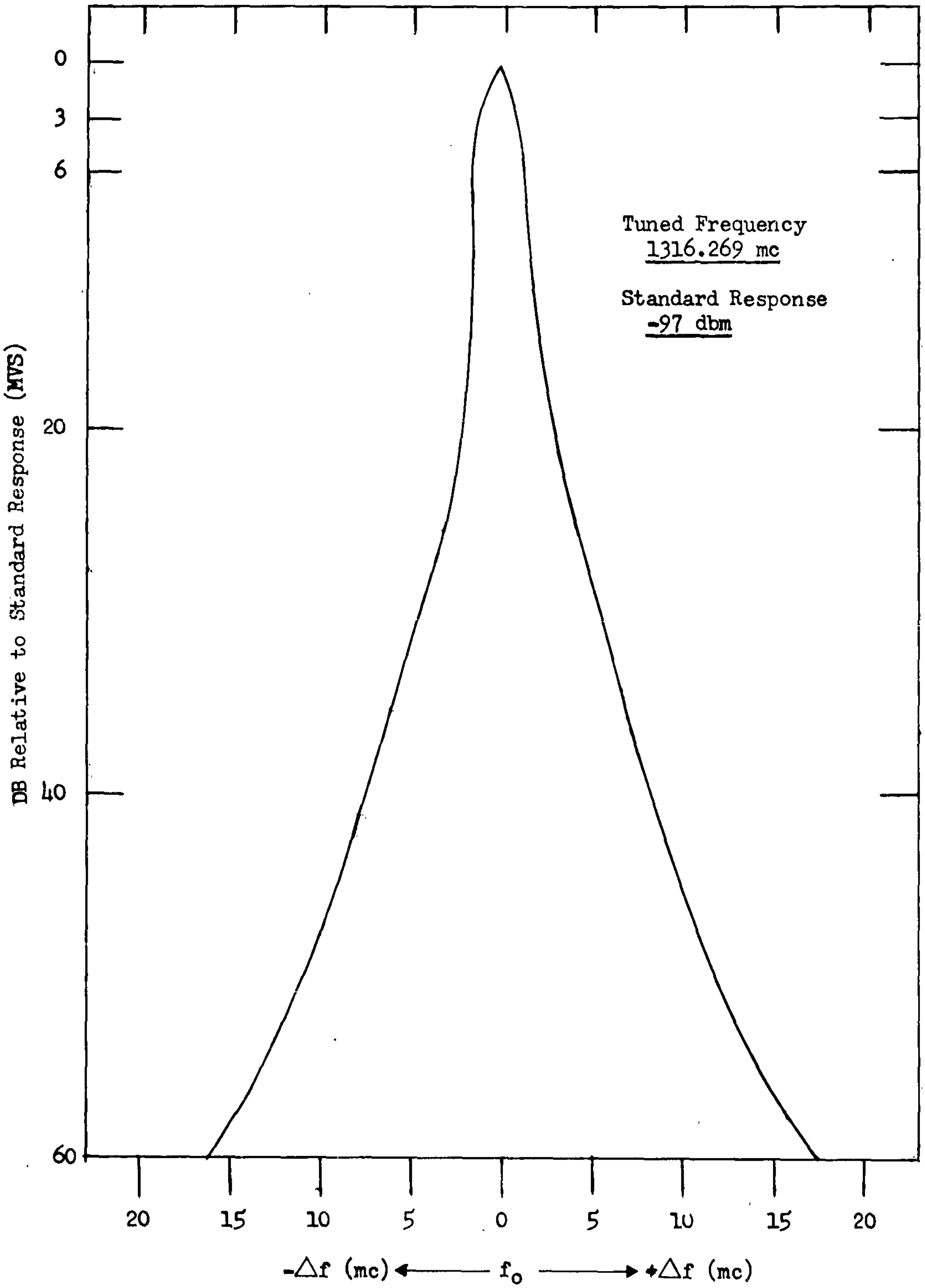


Figure 3.3.5.7 Normal Receiver Selectivity Curve - 1.5 usec Pulse

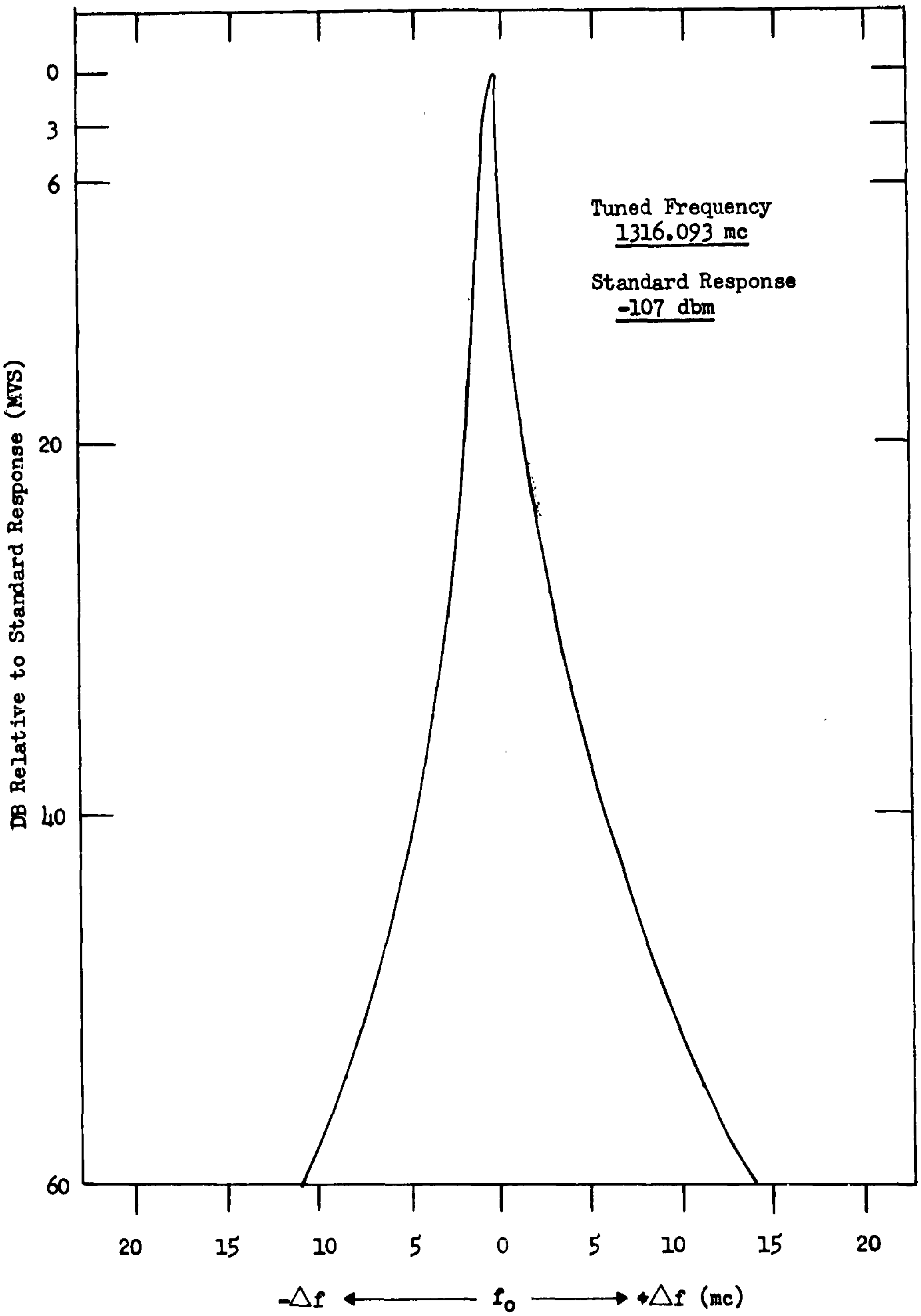


Figure 3.3.5.8 Normal Receiver Selectivity Curve - 3.0 usec Pulse

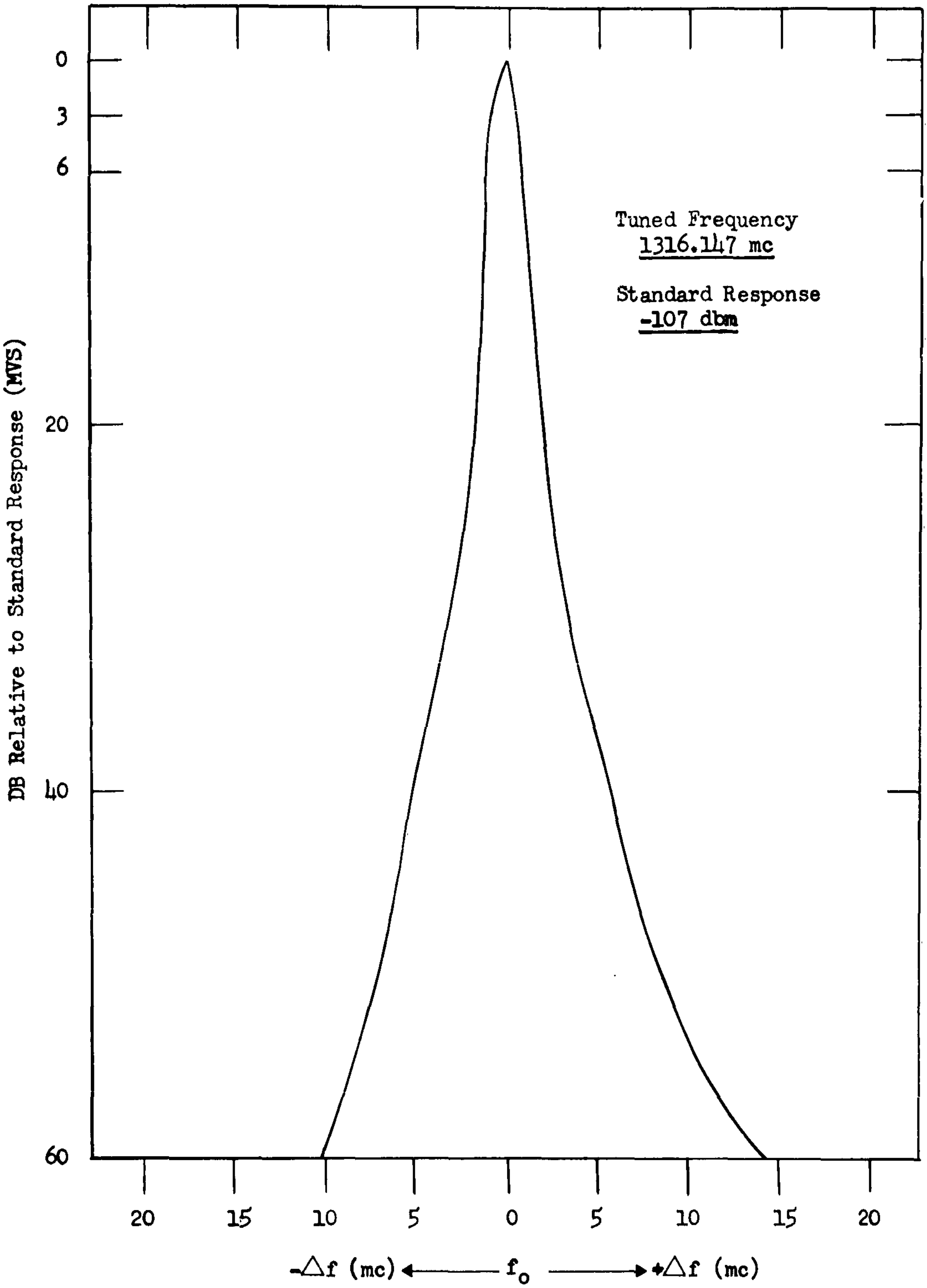


Figure 3.3.5.9 Normal Receiver Selectivity Curve - 6.0 usec Pulse

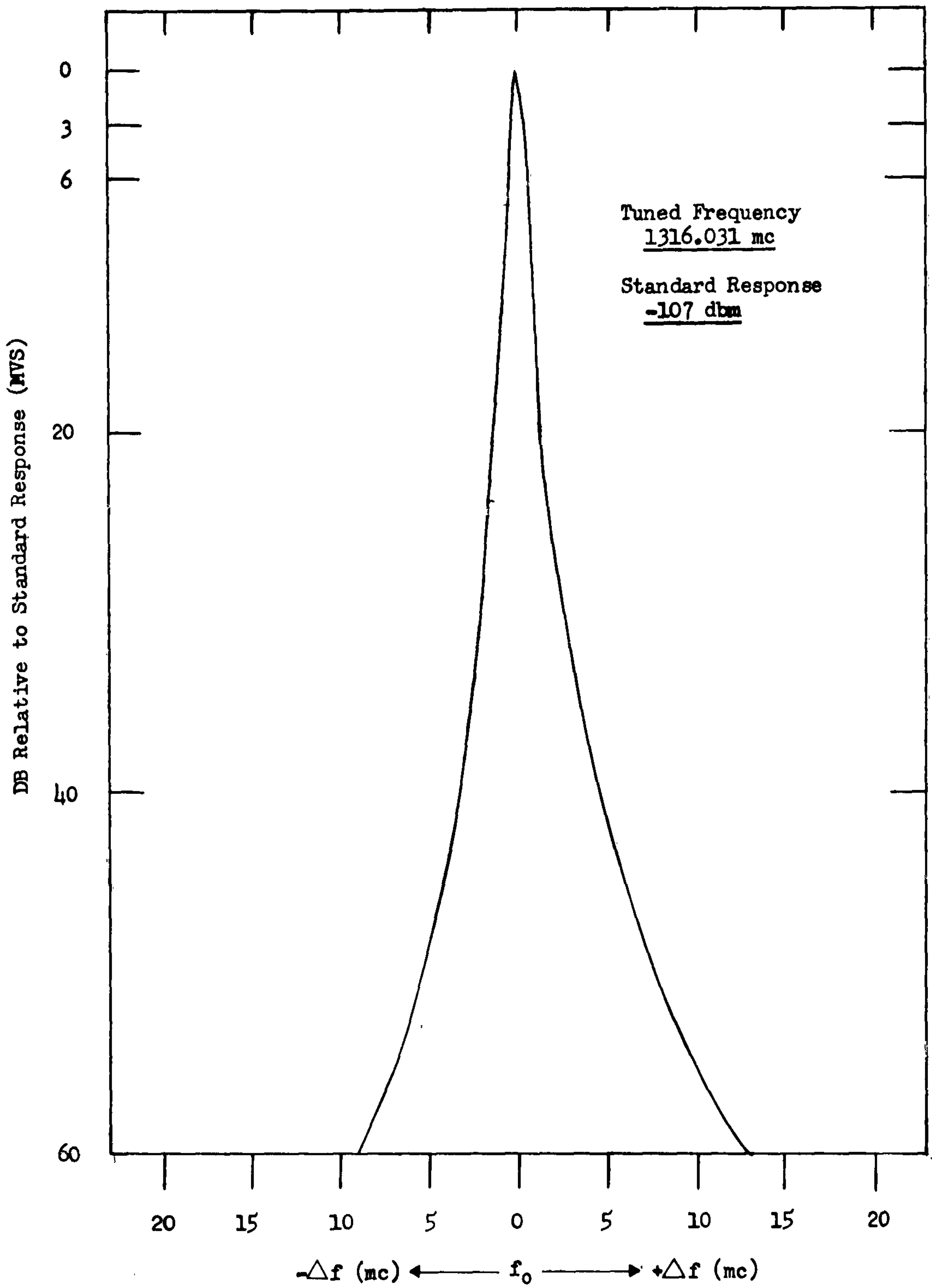


Figure 3.3.5.10 Normal Receiver Sensitivity Curve - 9.0 usec Pulse

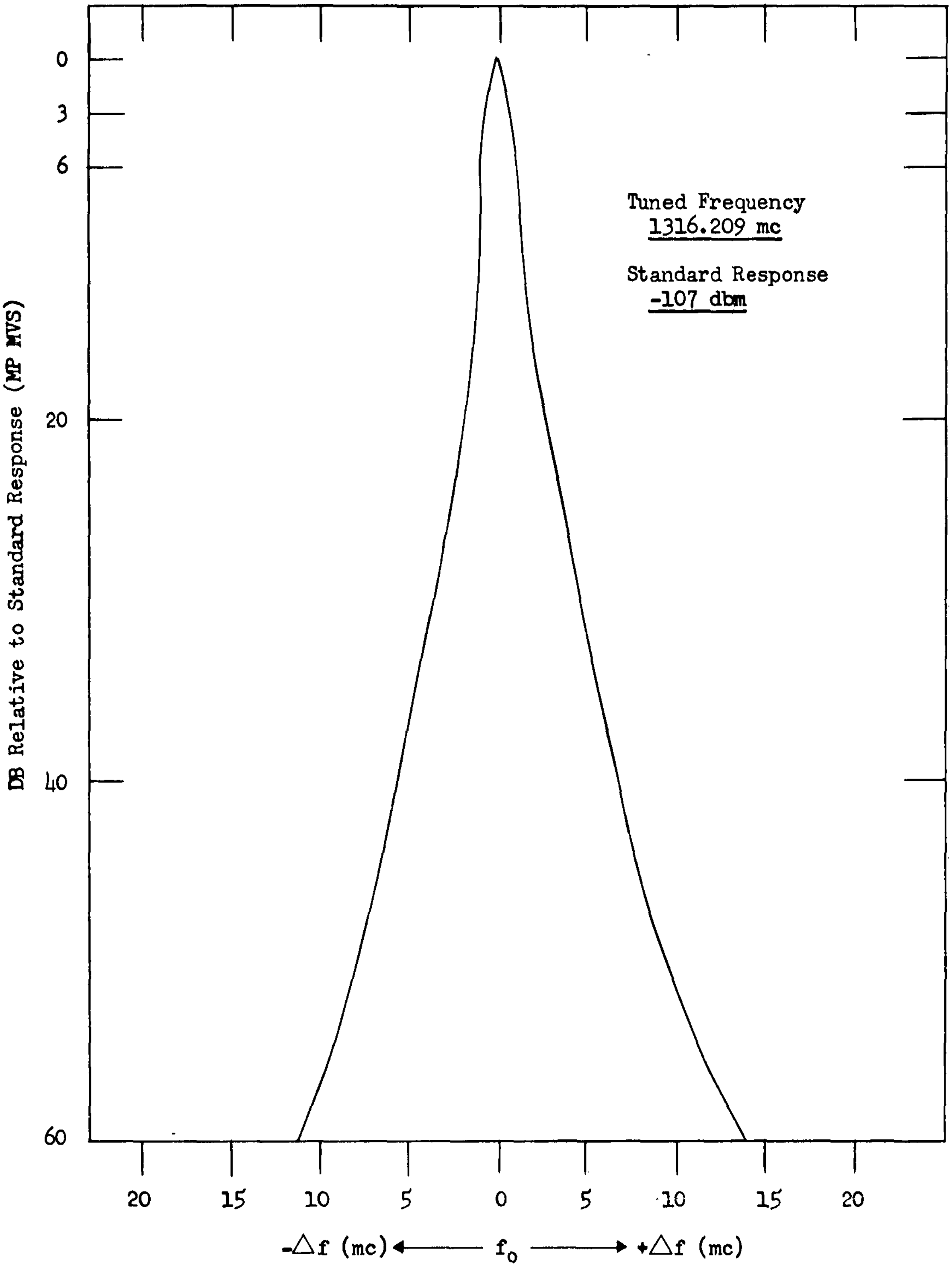


Figure 3.3.5.11 Normal Receiver Selectivity Curve - 15.0 usec Pulse

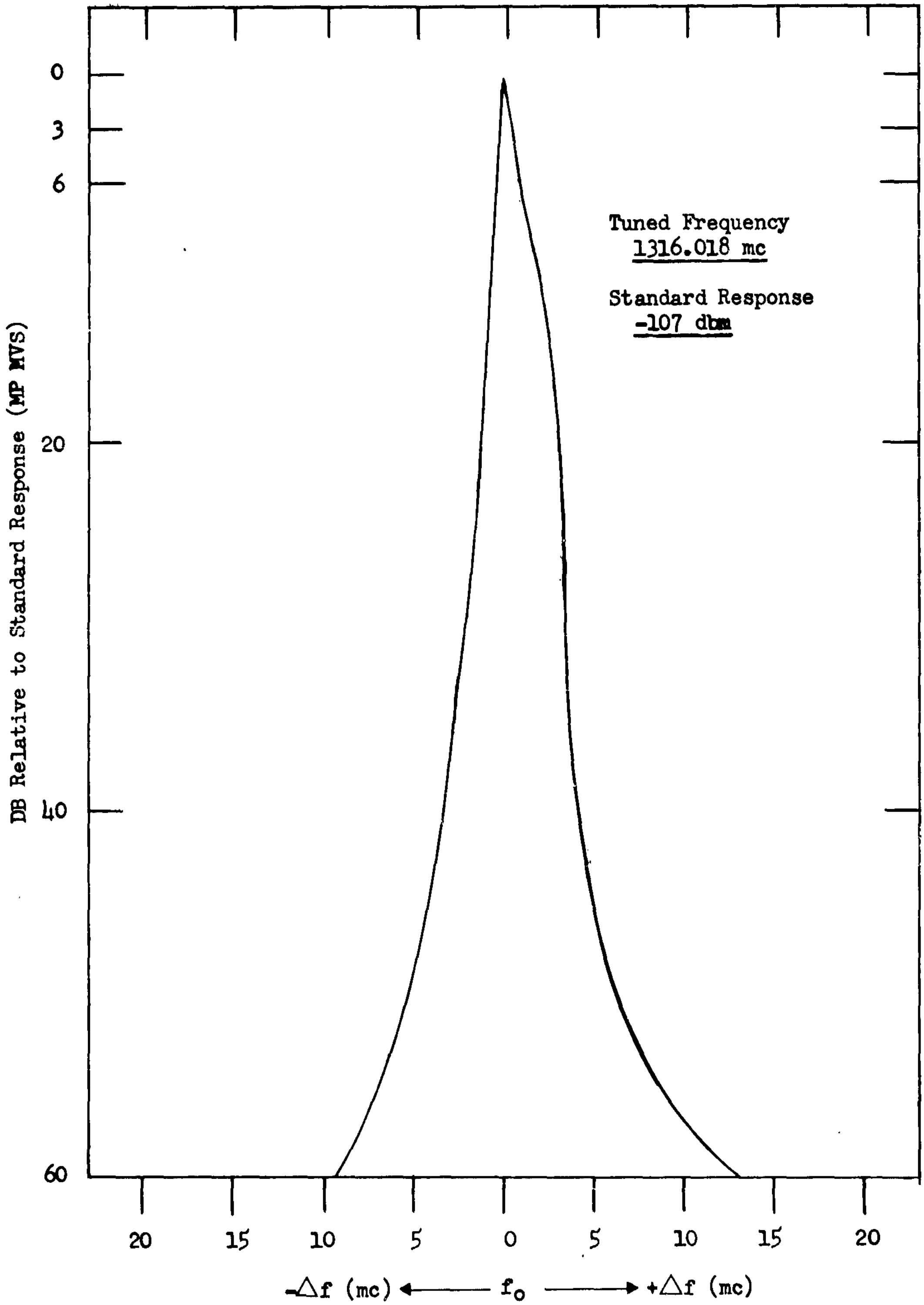


Figure 3.3.5.12 Normal Receiver Selectivity Curve - 30.0 usec Pulse

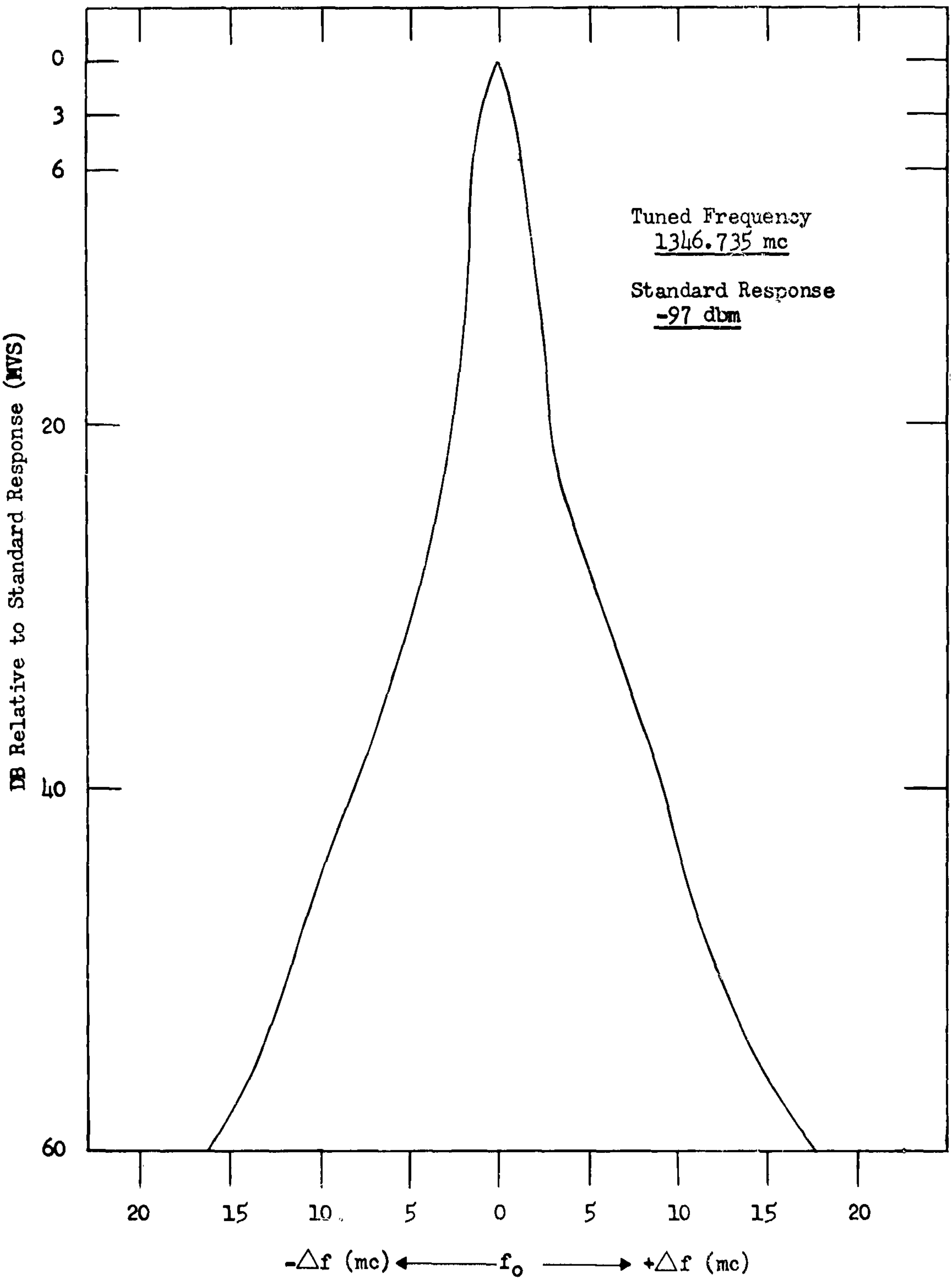


Figure 3.3.5.13 Normal Receiver Selectivity Curve - 1.5 usec pulse

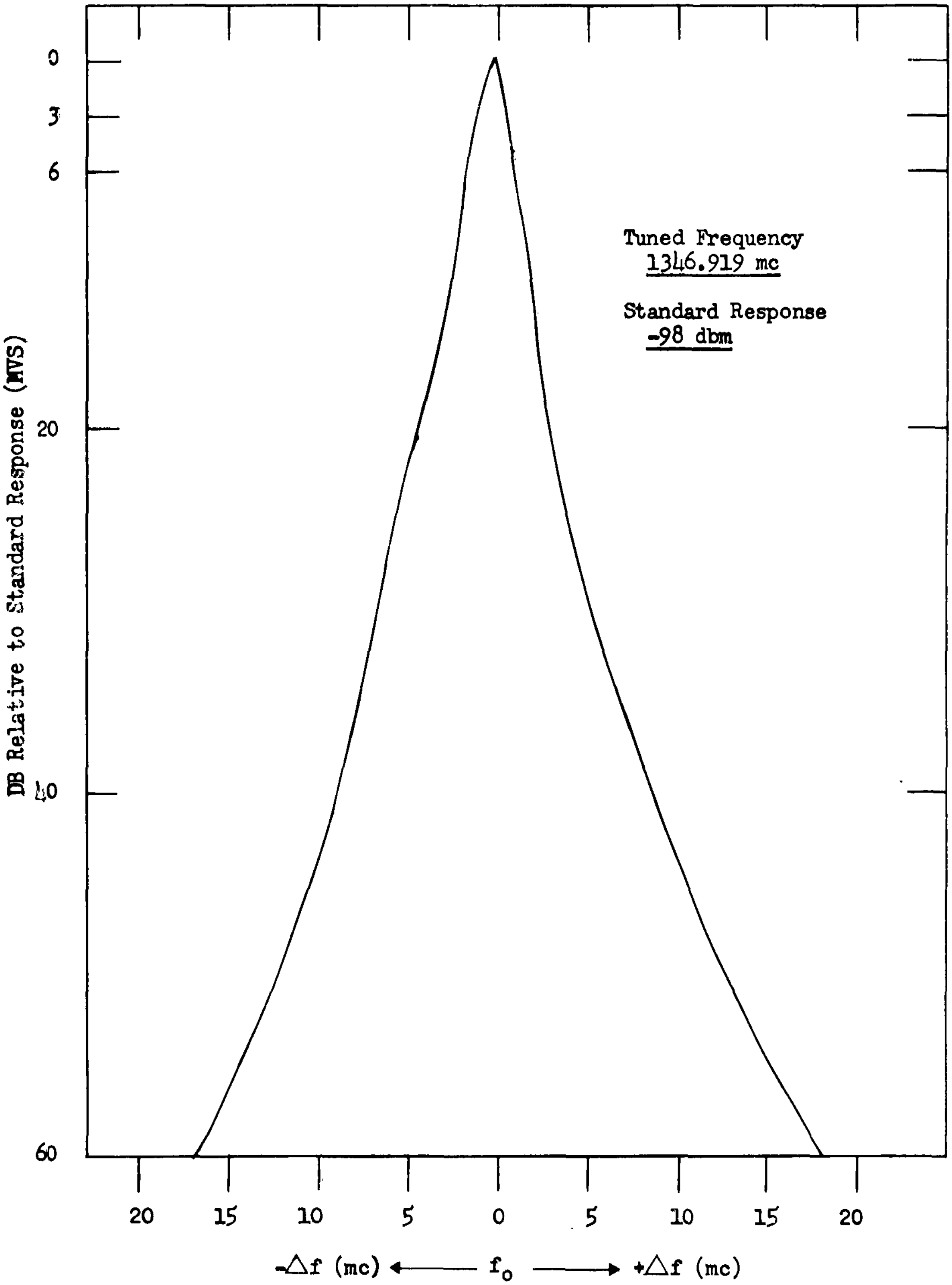


Figure 3.3.5.14 Normal Receiver Selectivity Curve - 3.0 usec Pulse

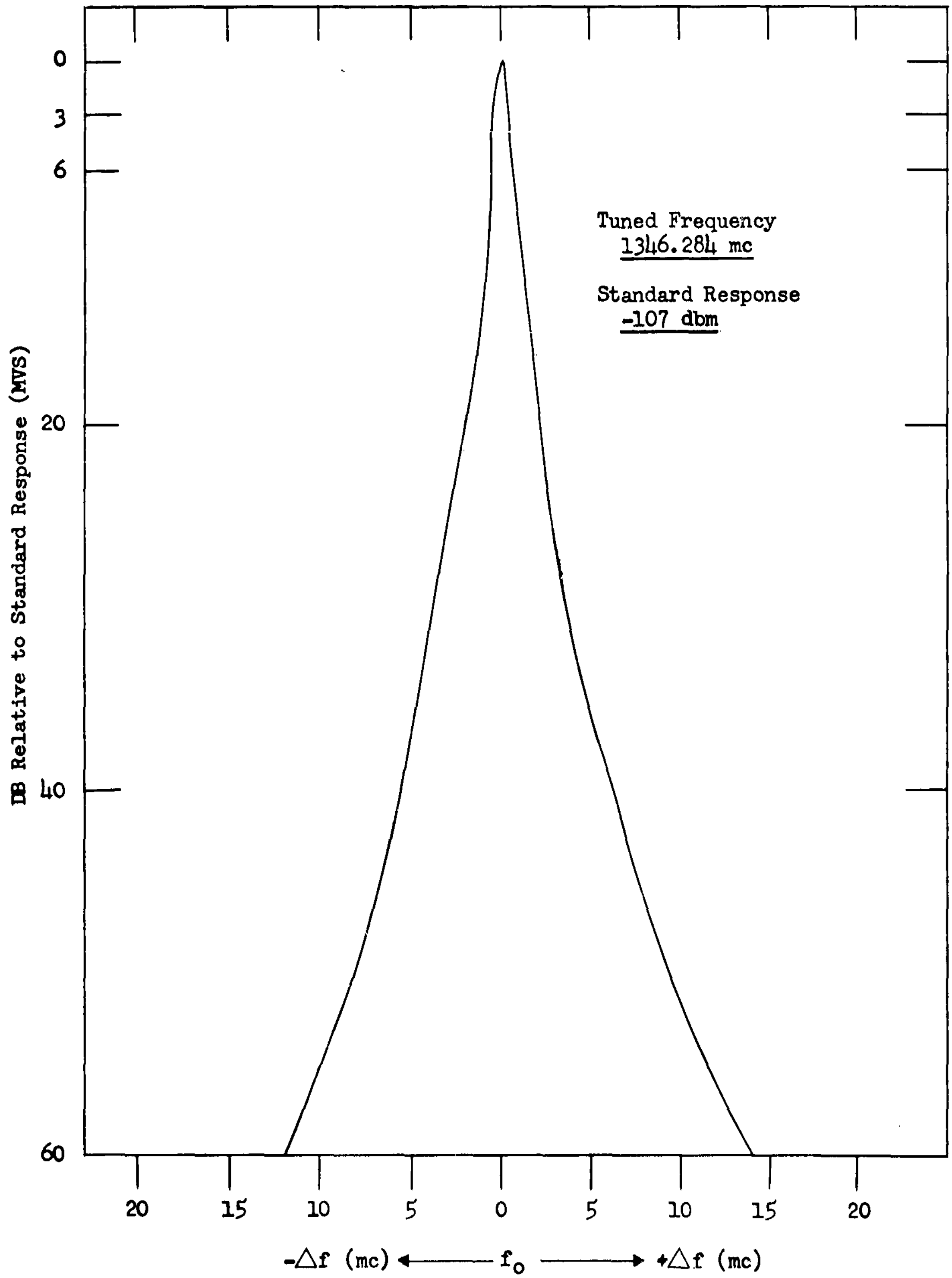


Figure 3.3.5.15 Normal Receiver Selectivity Curve - 6.0 usec pulse

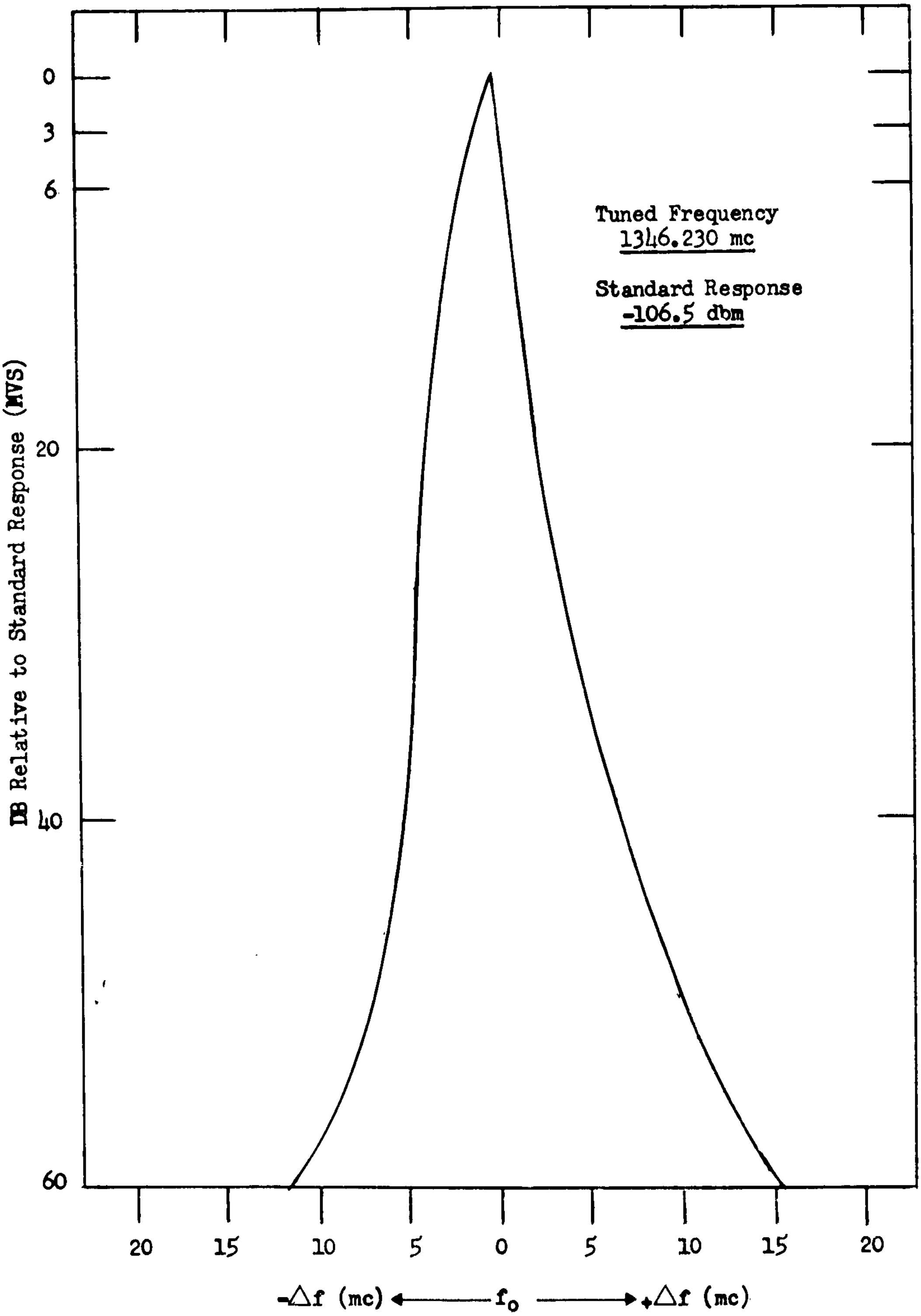


Figure 3.3.5.16 Normal Receiver Selectivity Curve - 9.0 usec Pulse

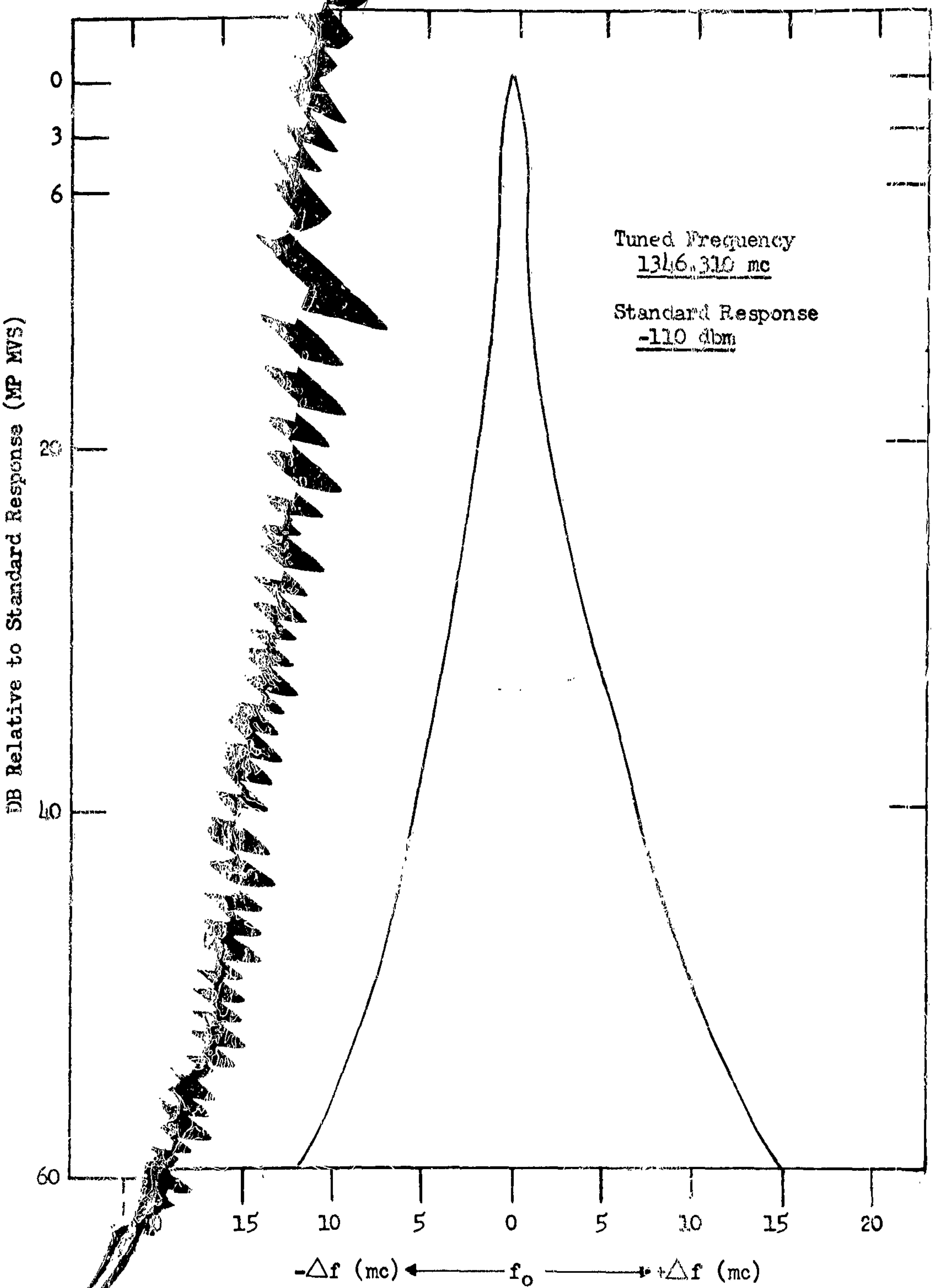


Figure 3.3.5.17 Normal Receiver Selectivity Curve - 15.0 usec Pulse

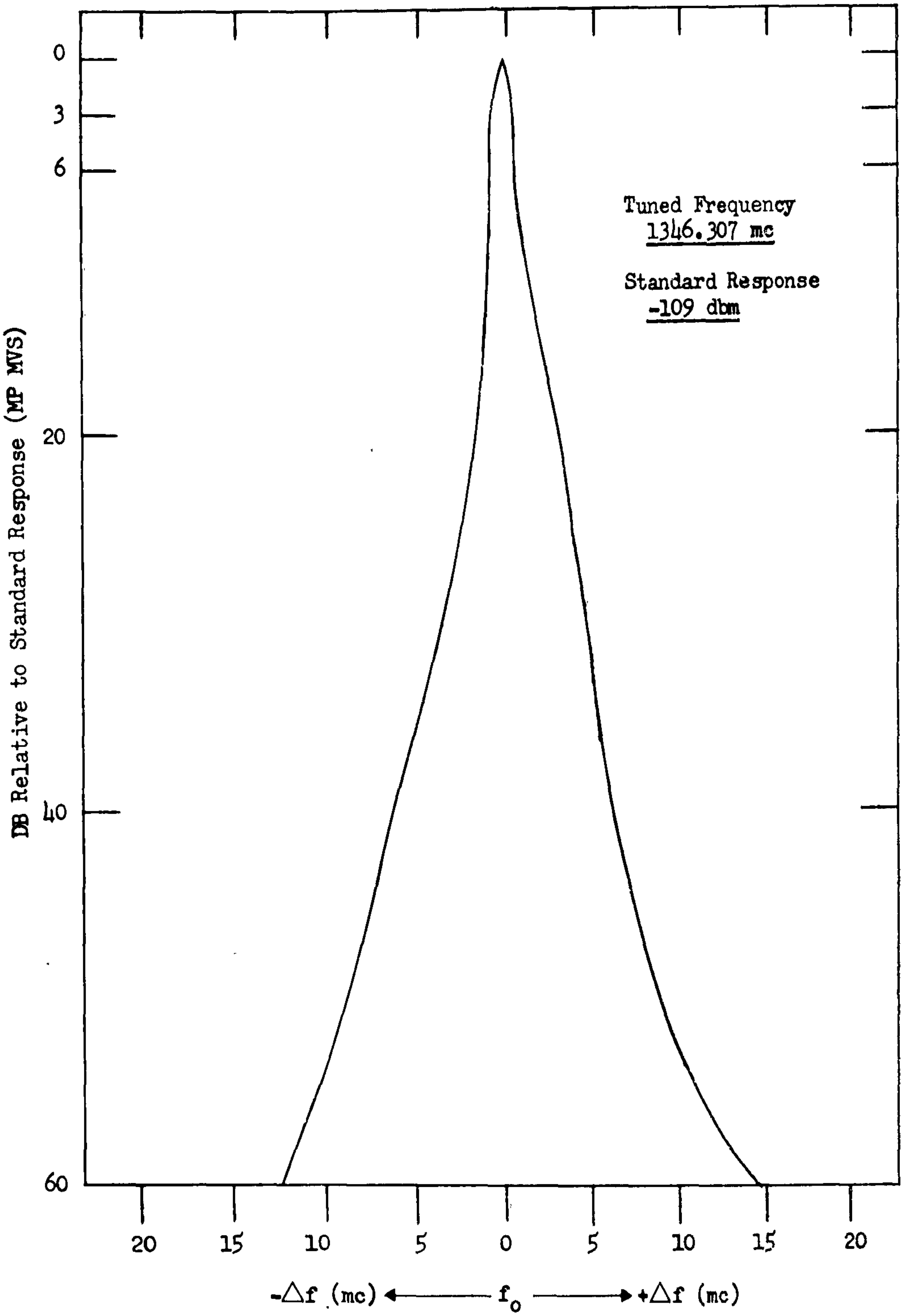


Figure 3.3.5.18 **Normal Receiver Selectivity Curve - 30.0 usec Pulse**

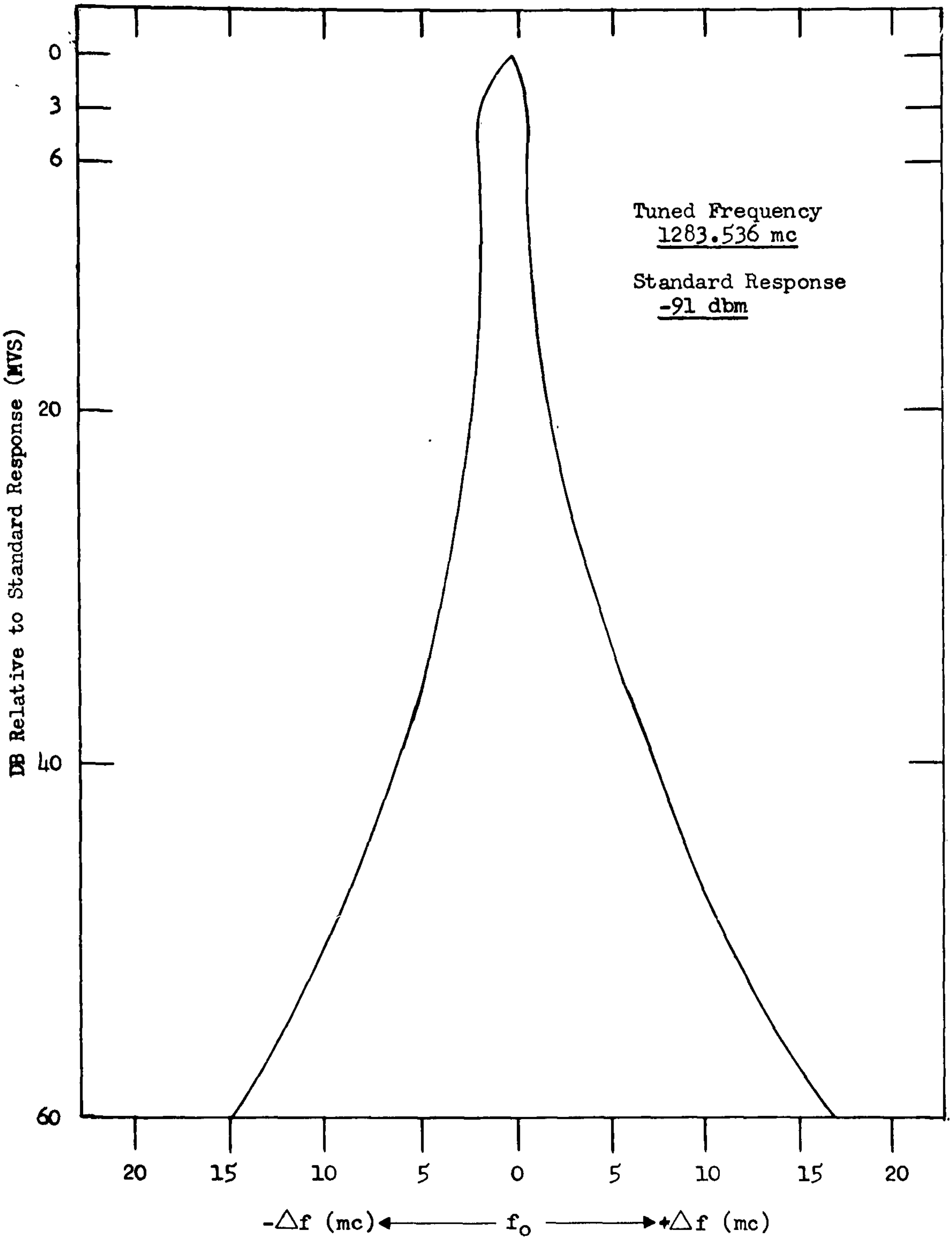


Figure 3.3.5.19 MTI Receiver Selectivity Curve - 1.5 usec Pulse

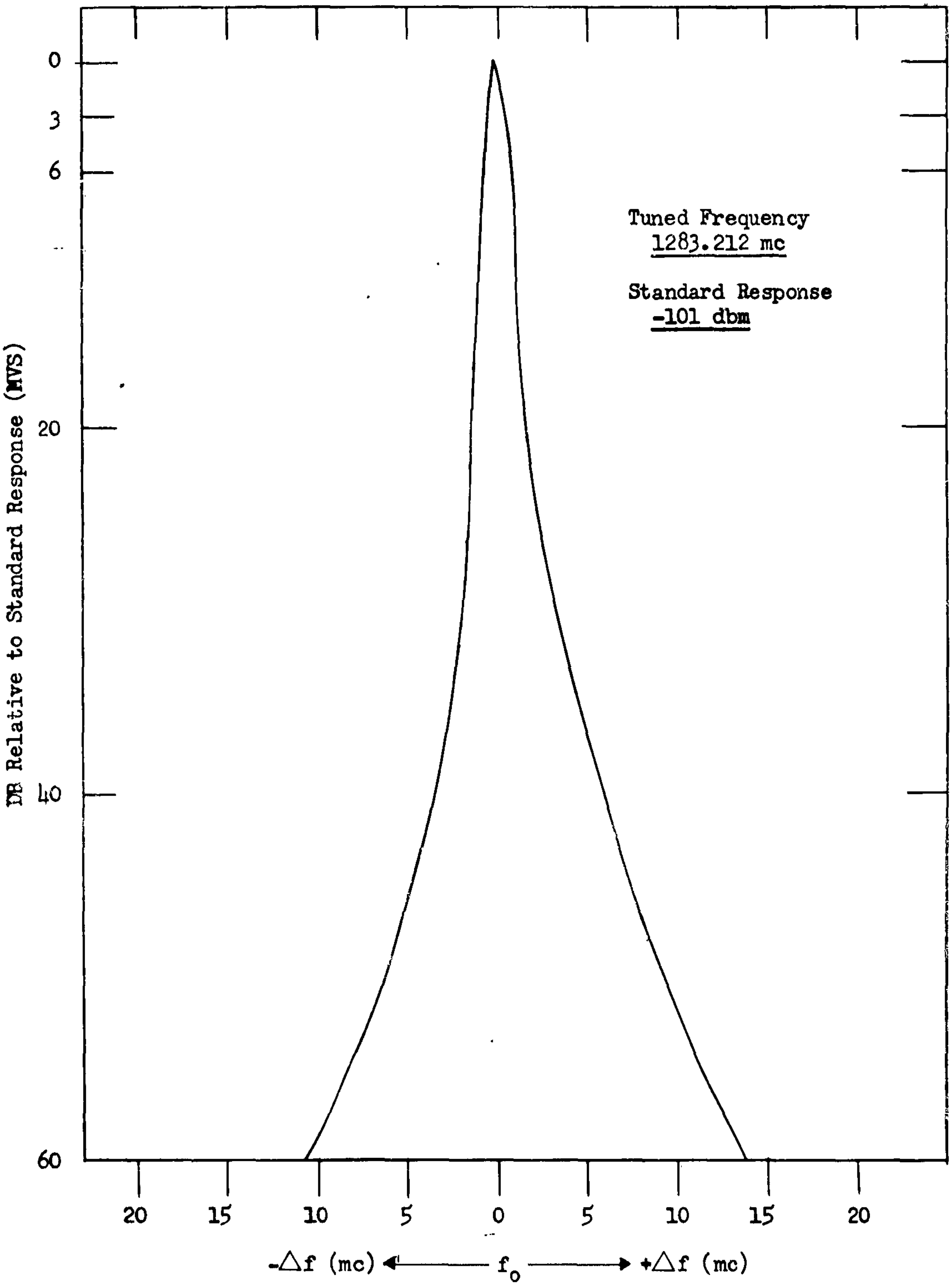


Figure 3.3.5.20 MTI Receiver Selectivity Curve - 3.0 usec Pulse

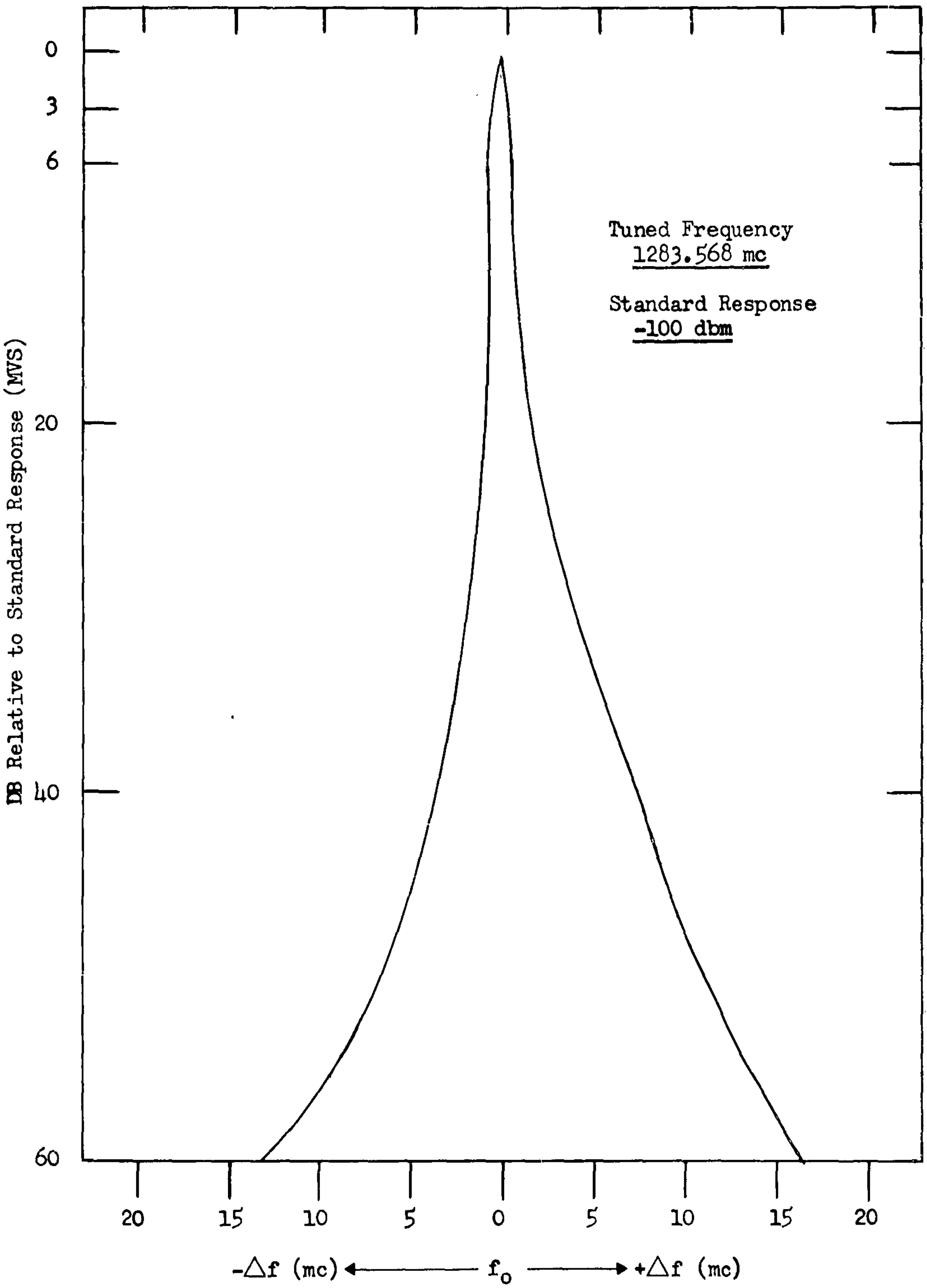


Figure 3.3.5.21 MTI Receiver Selectivity Curve - 6.0 usec Pulse

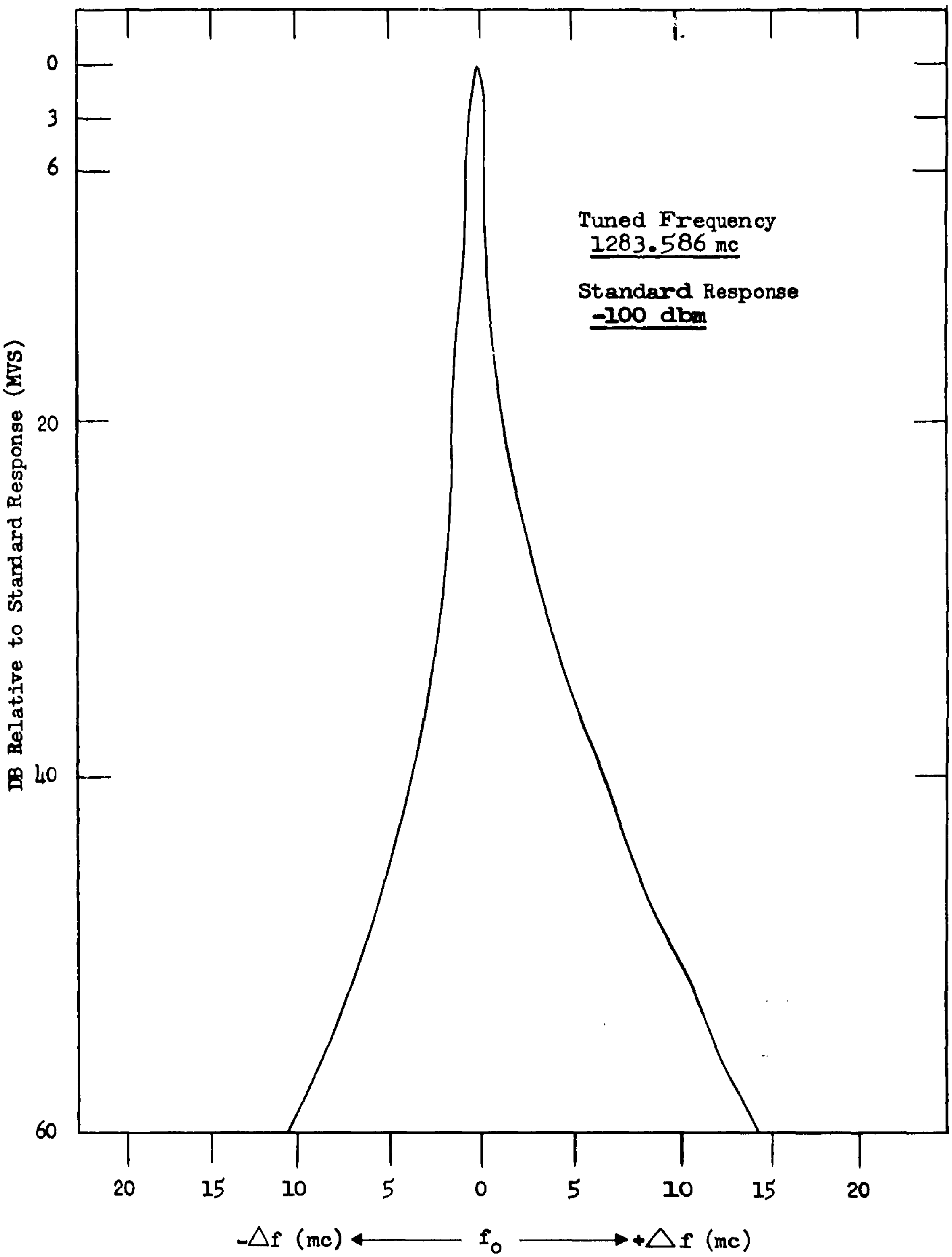


Figure 3.3.5.22 MTI Receiver Selectivity Curve - 9.0 usec Pulse

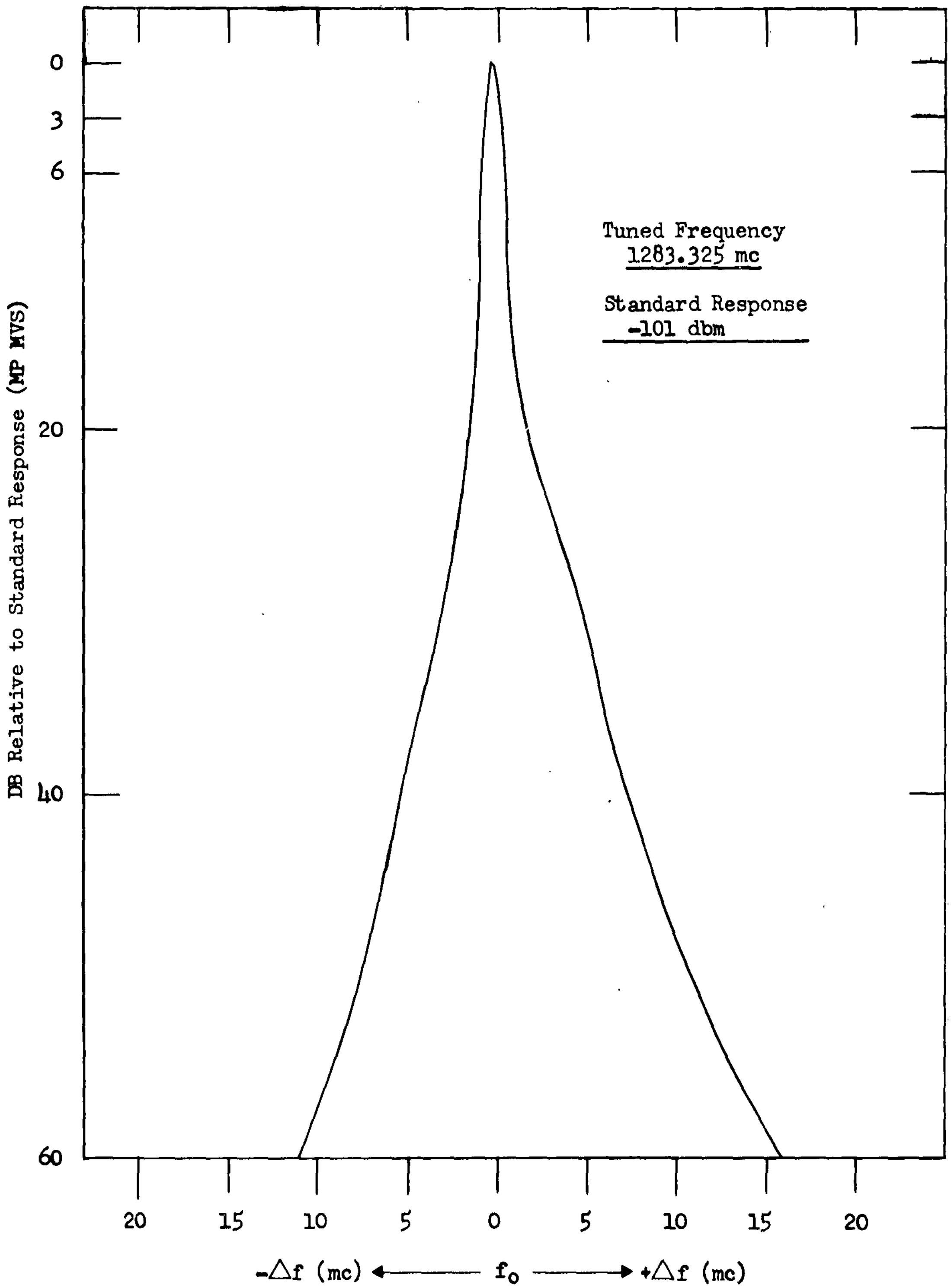


Figure 3.3.5.23 MTI Receiver Selectivity Curve - 15.0 usec Pulse

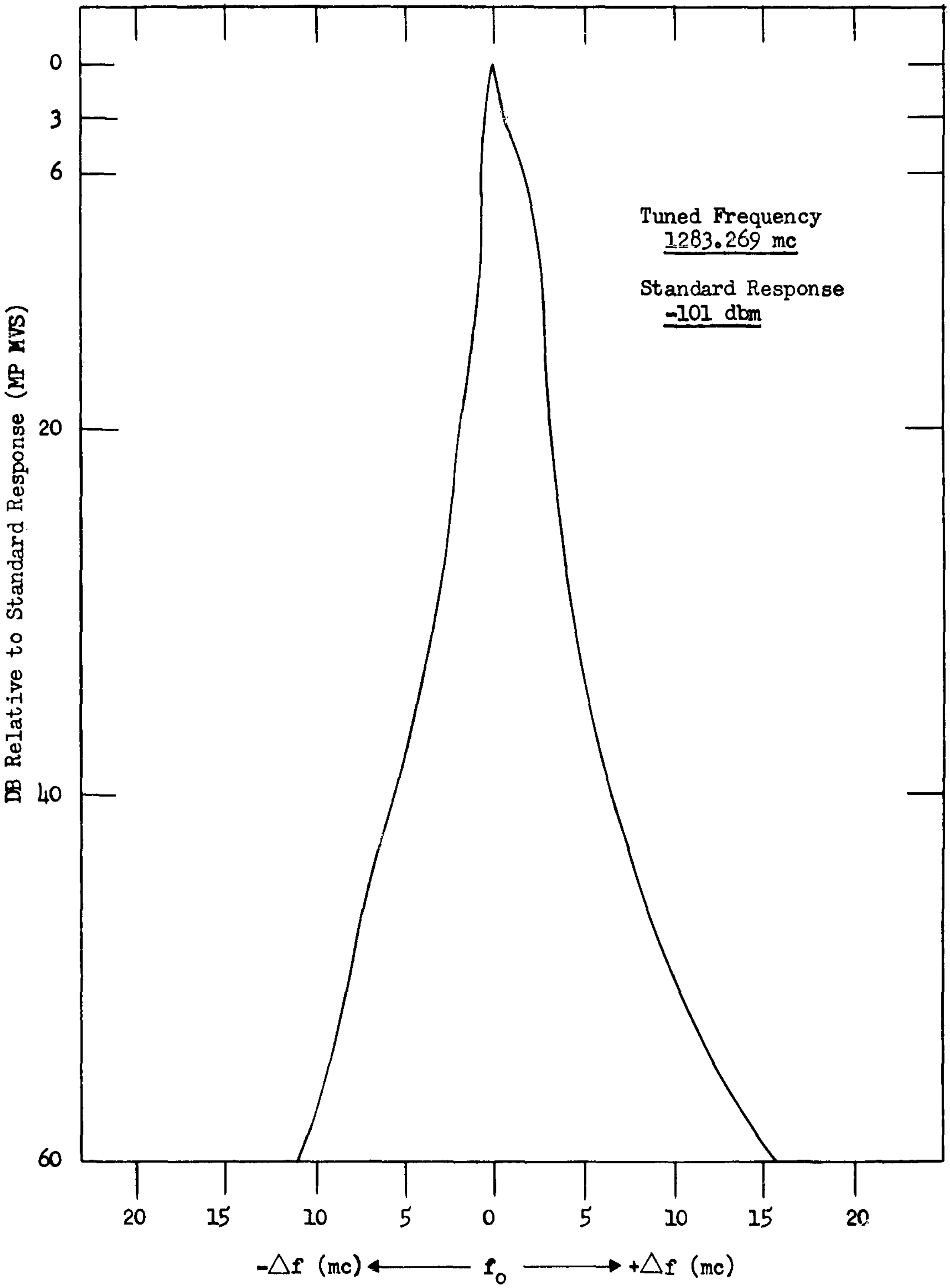


Figure 3.3.5.24 MTI Receiver Selectivity Curve - 30.0 usec Pulse

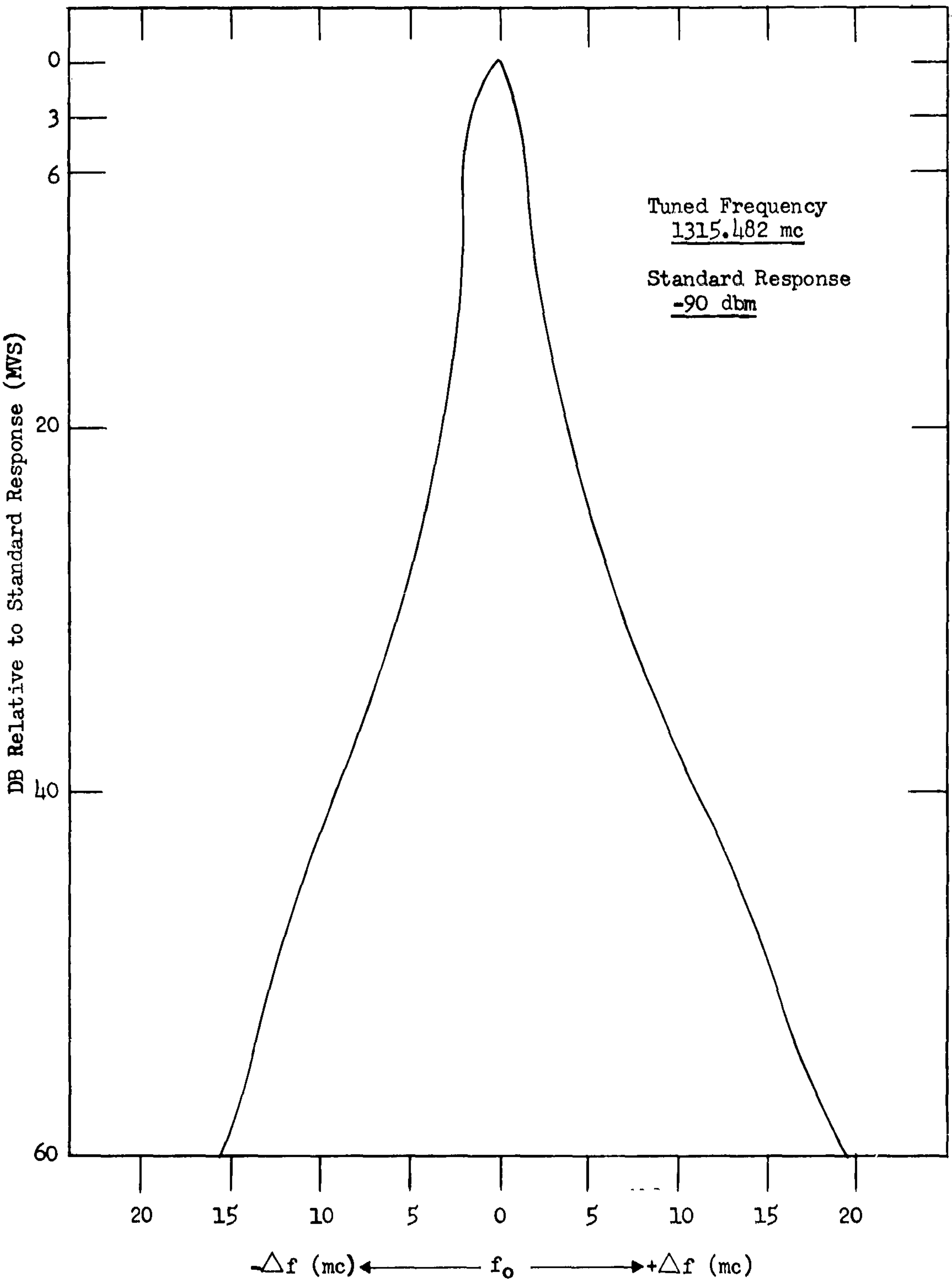


Figure 3.3.5.25 MTI Receiver Selectivity Curve - 1.5 usec Pulse

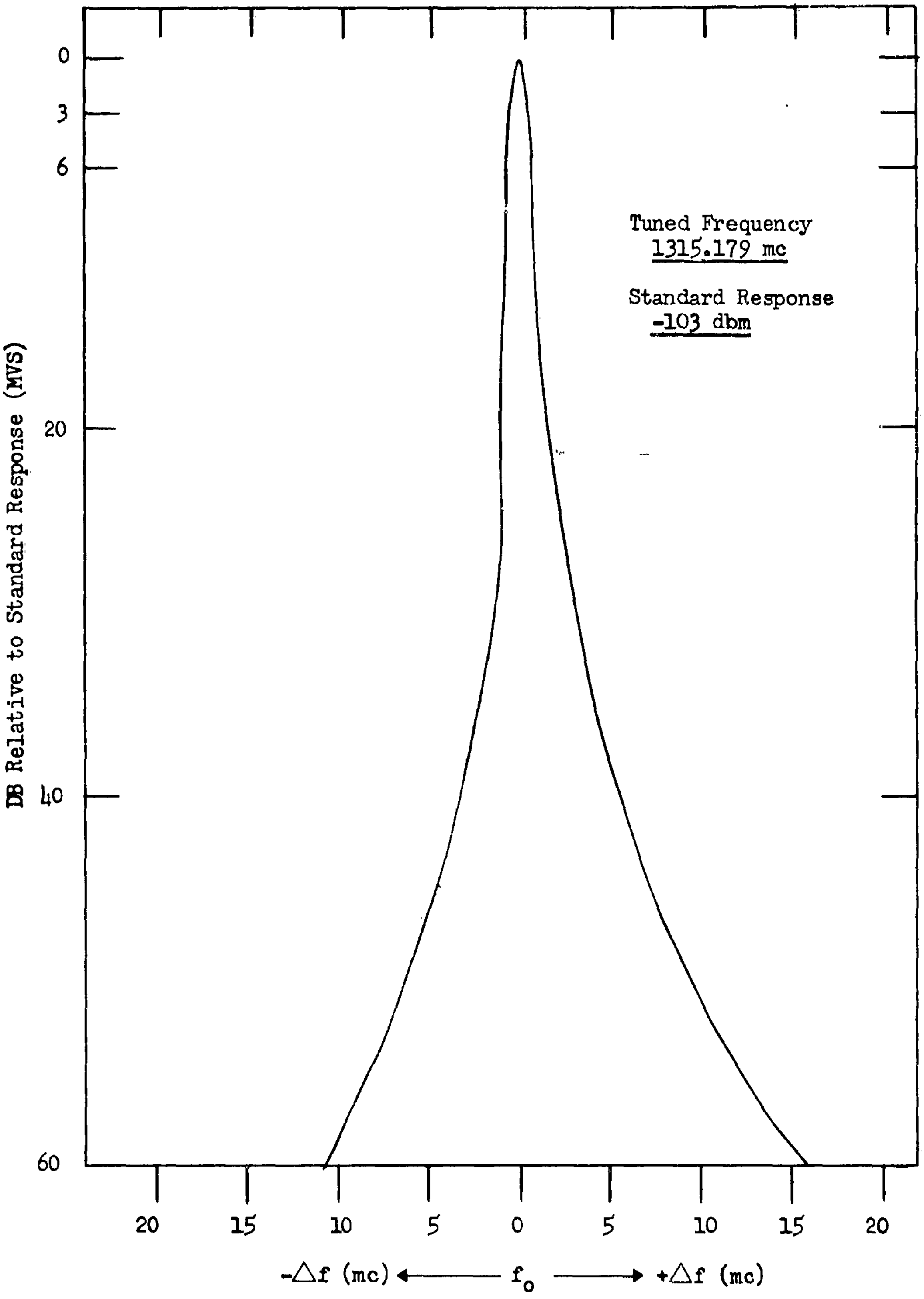


Figure 3.3.5.26 MTI Receiver Selectivity Curve - 3.0 usec Pulse

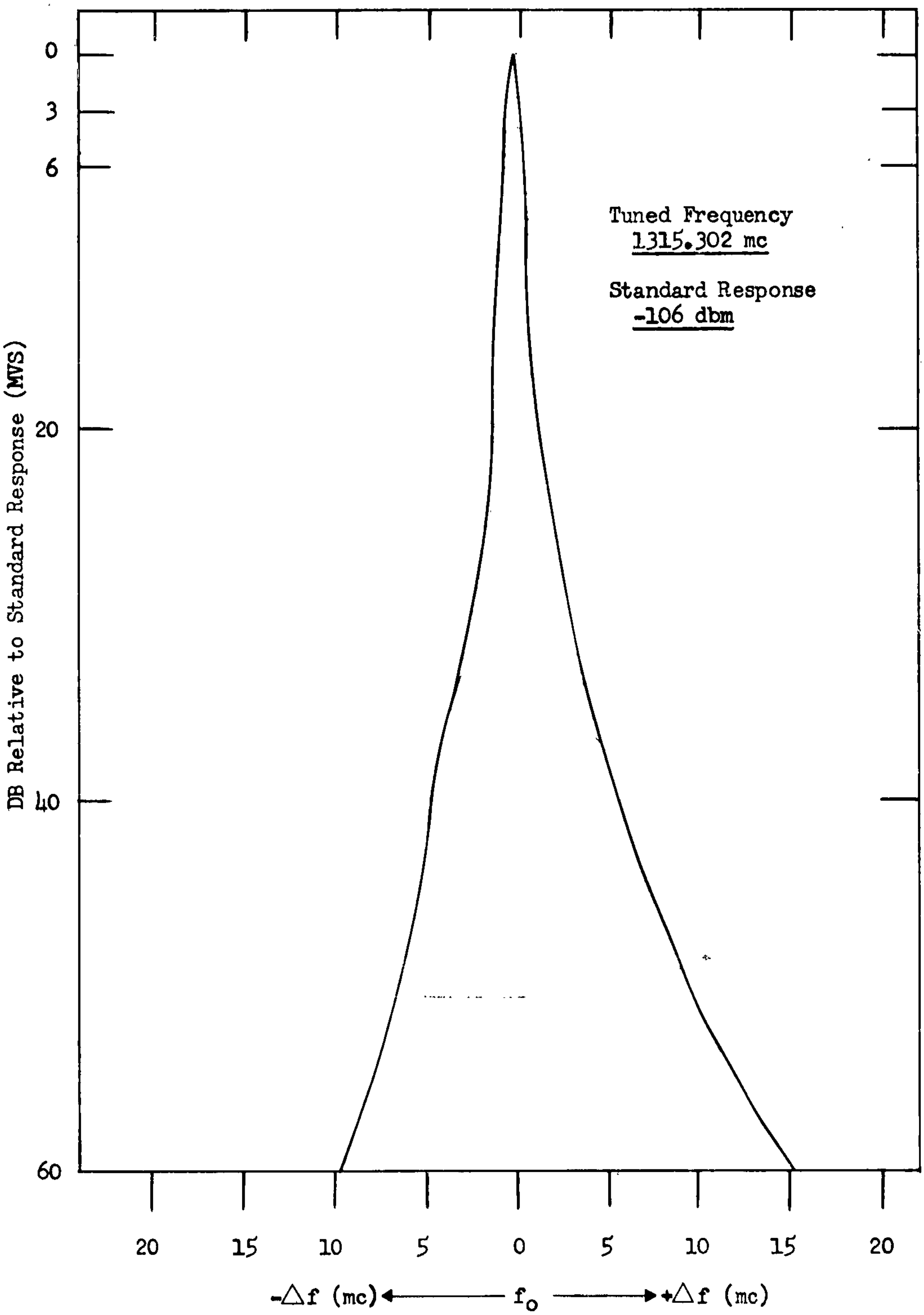


Figure 3.3.5.27 MTI Receiver Selectivity Curve - 6.0 usec Pulse

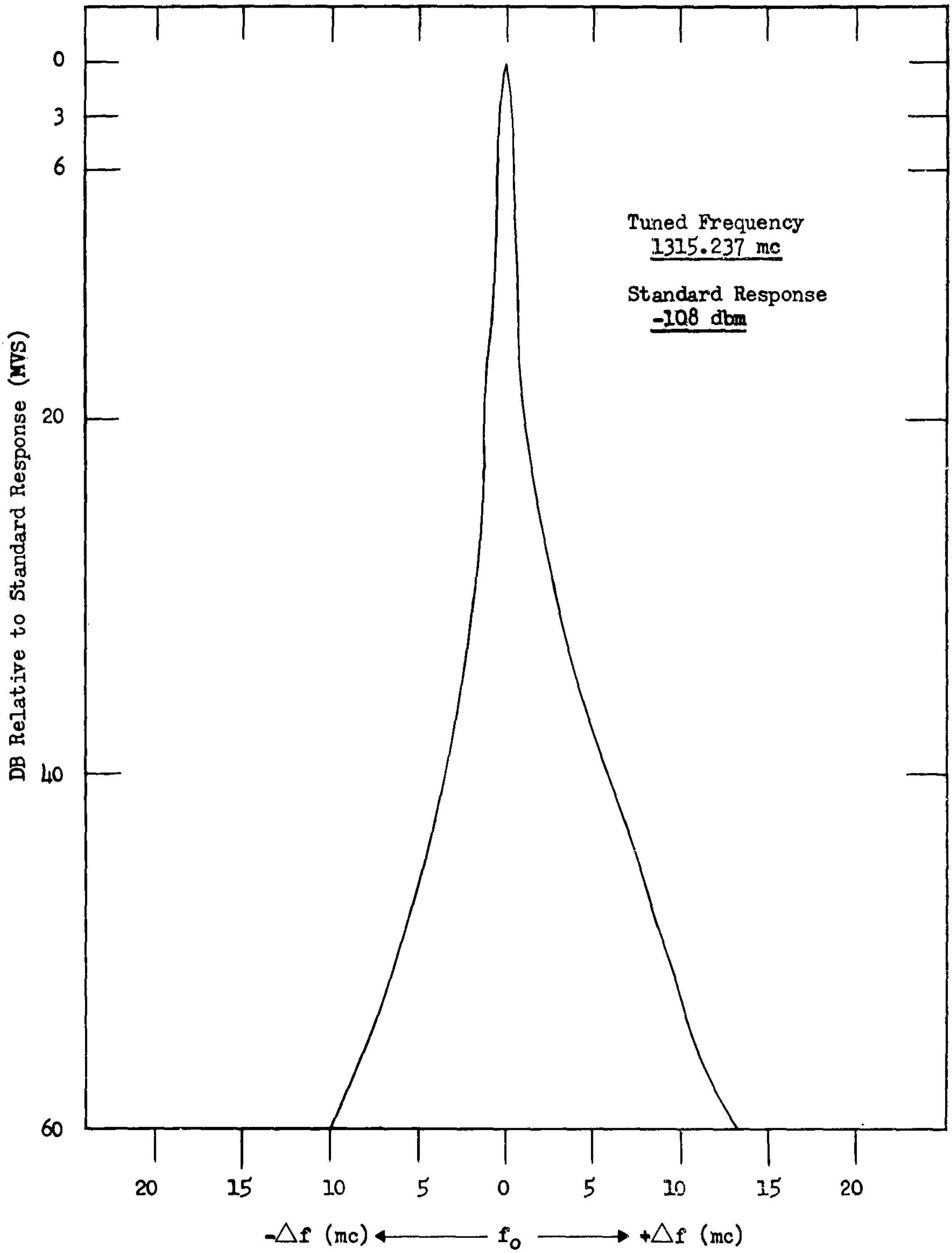


Figure 3.3.5.28 MTI Receiver Selectivity Curve - 9.0 usec Pulse

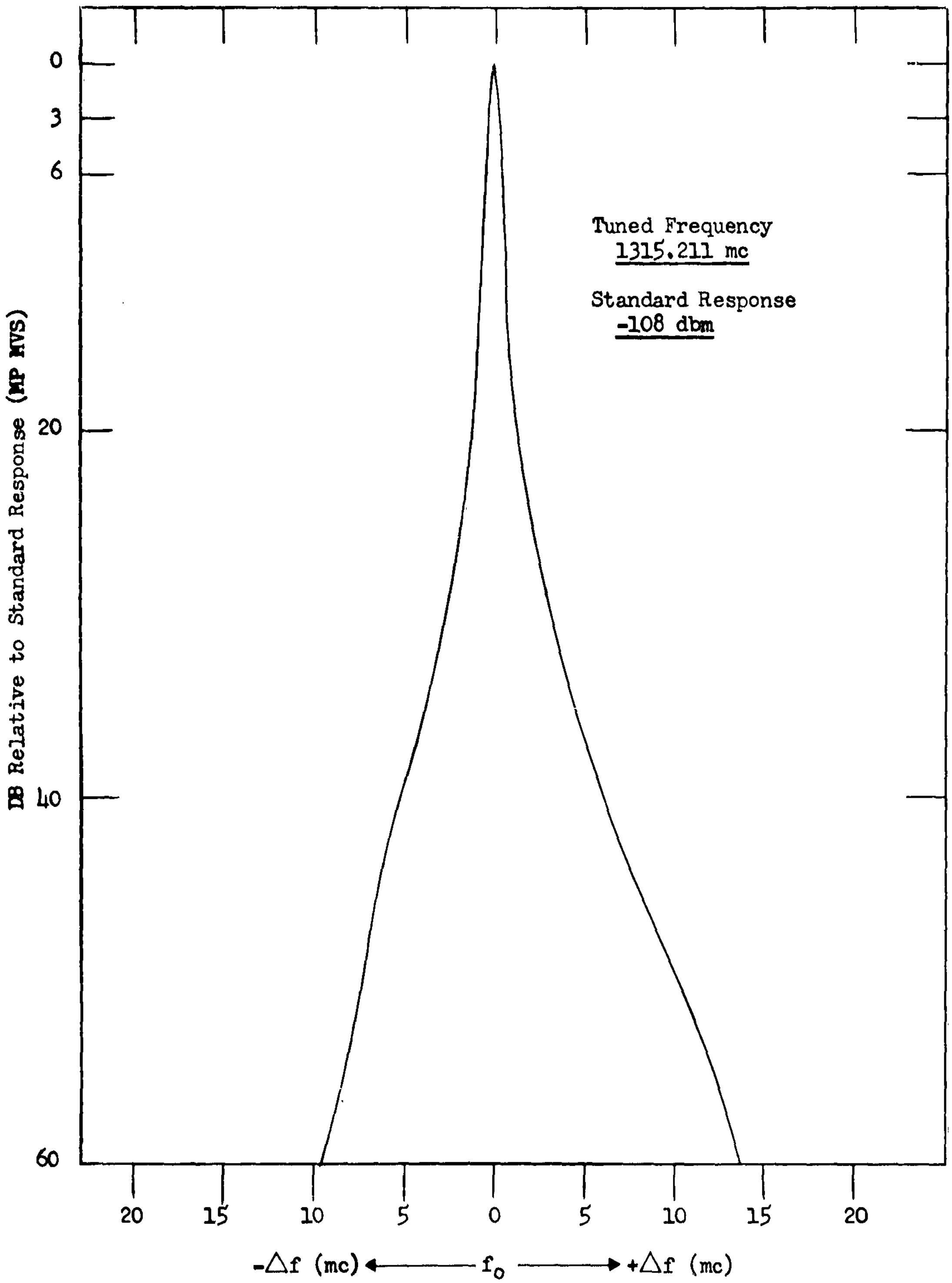


Figure 3.3.5.29 MTI Receiver Selectivity Curve - 15.0 usec Pulse

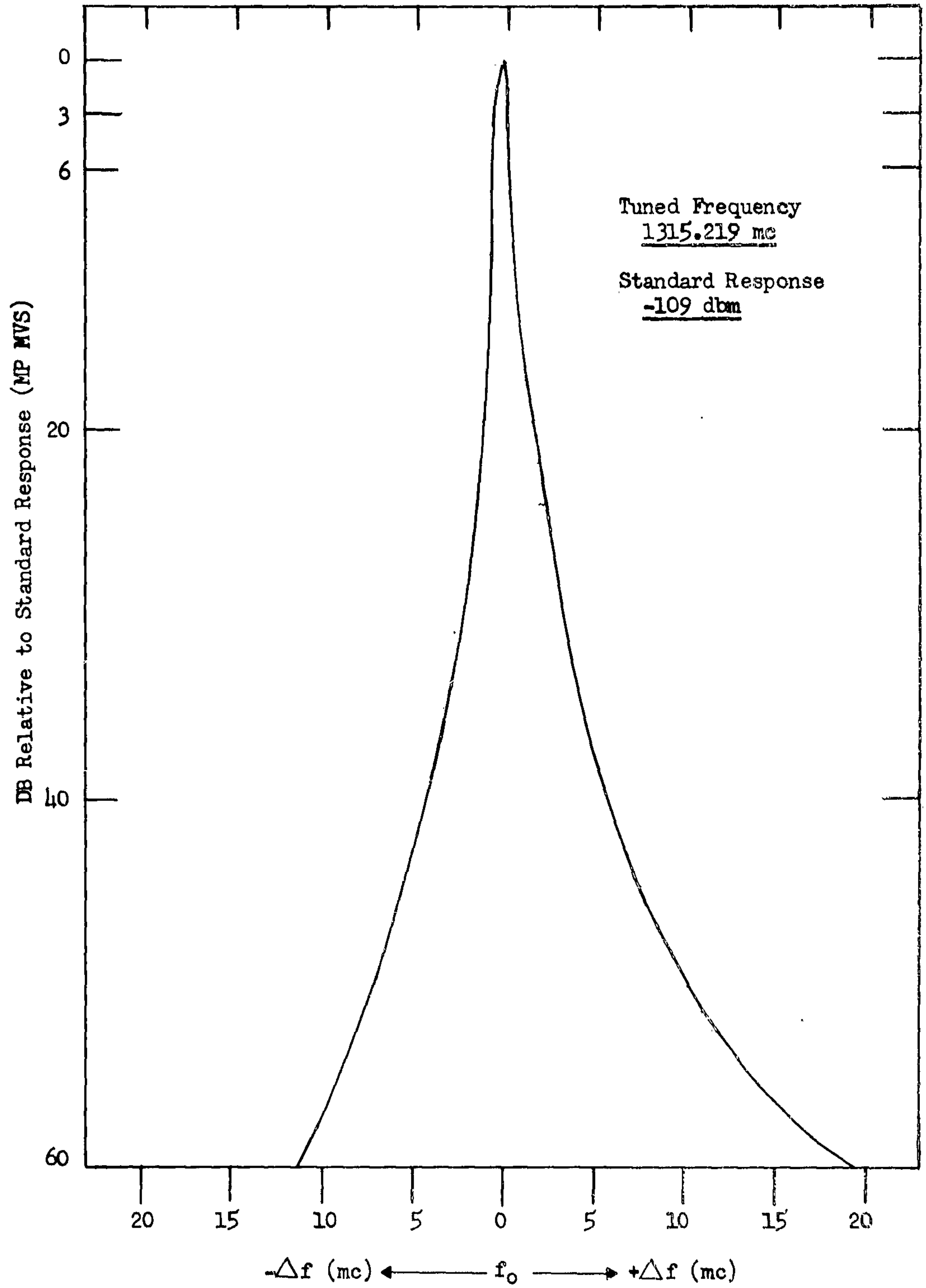


Figure 3.3.5.30 MTI Receiver Selectivity Curve - 30.0 usec Pulse

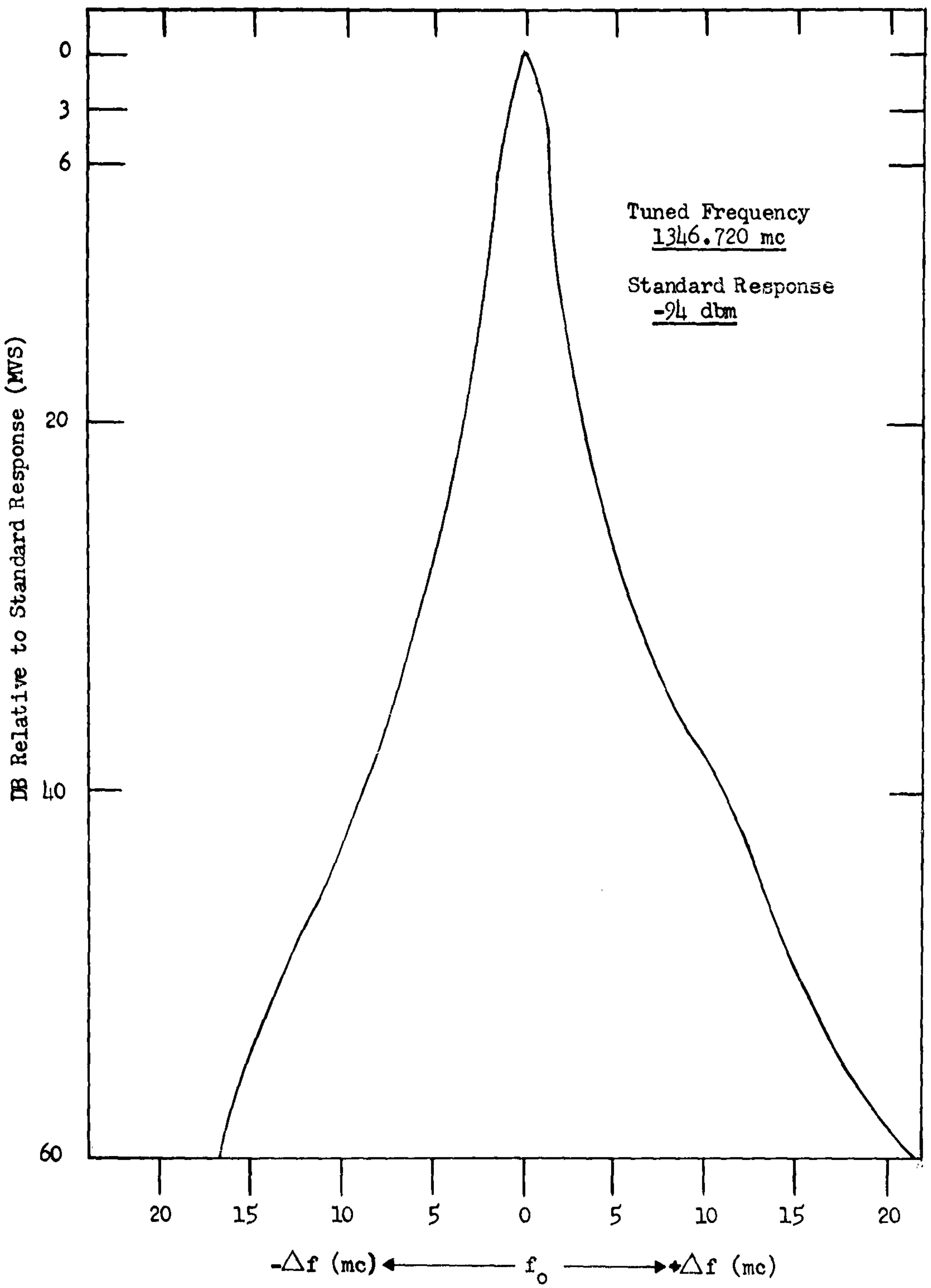


Figure 3.3.5.31 MTI Receiver Selectivity Curve - 1.5 usec Pulse

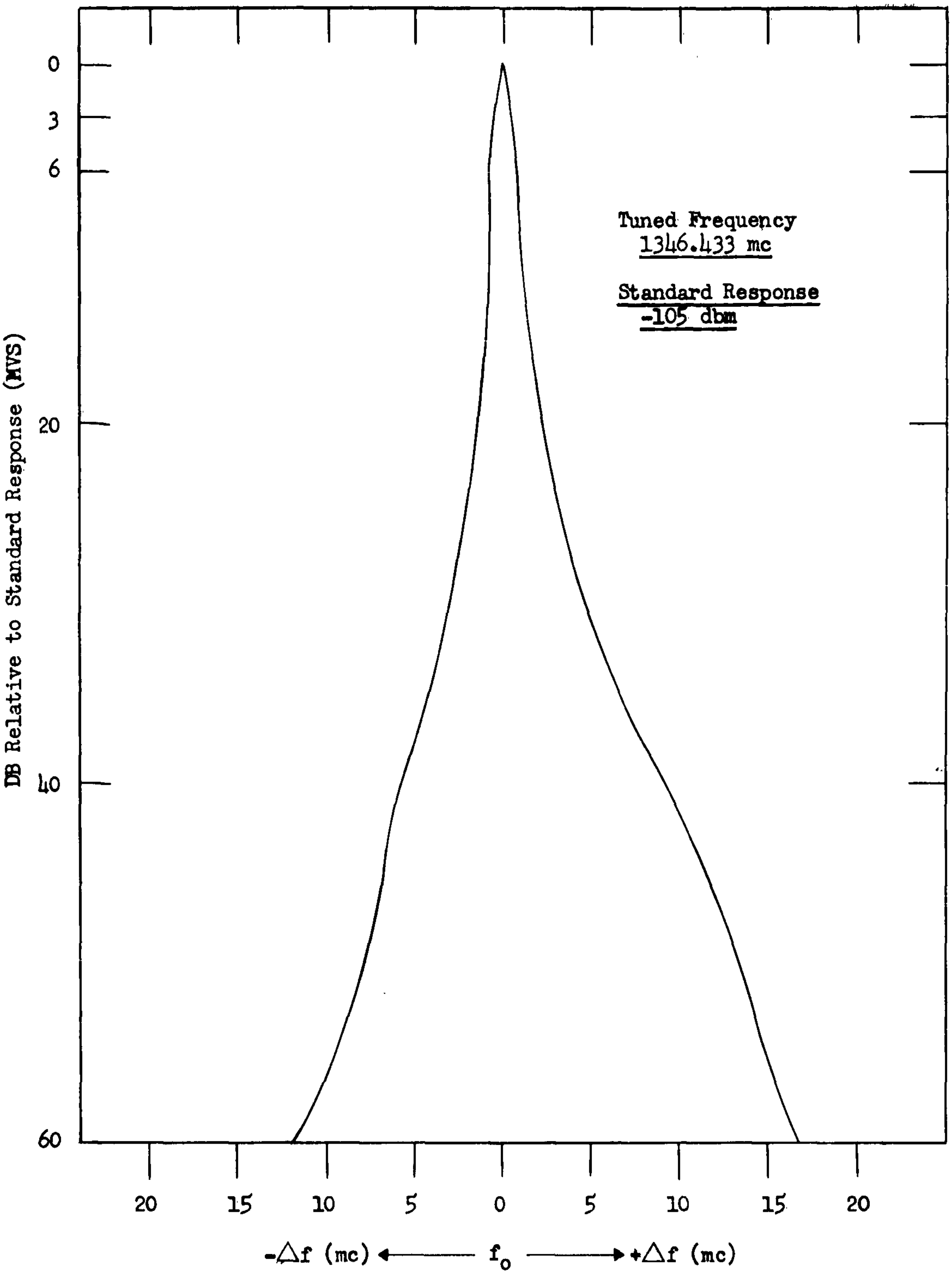


Figure 3.3.5.32 MTI Receiver Selectivity Curve - 3.0 usec Pulse

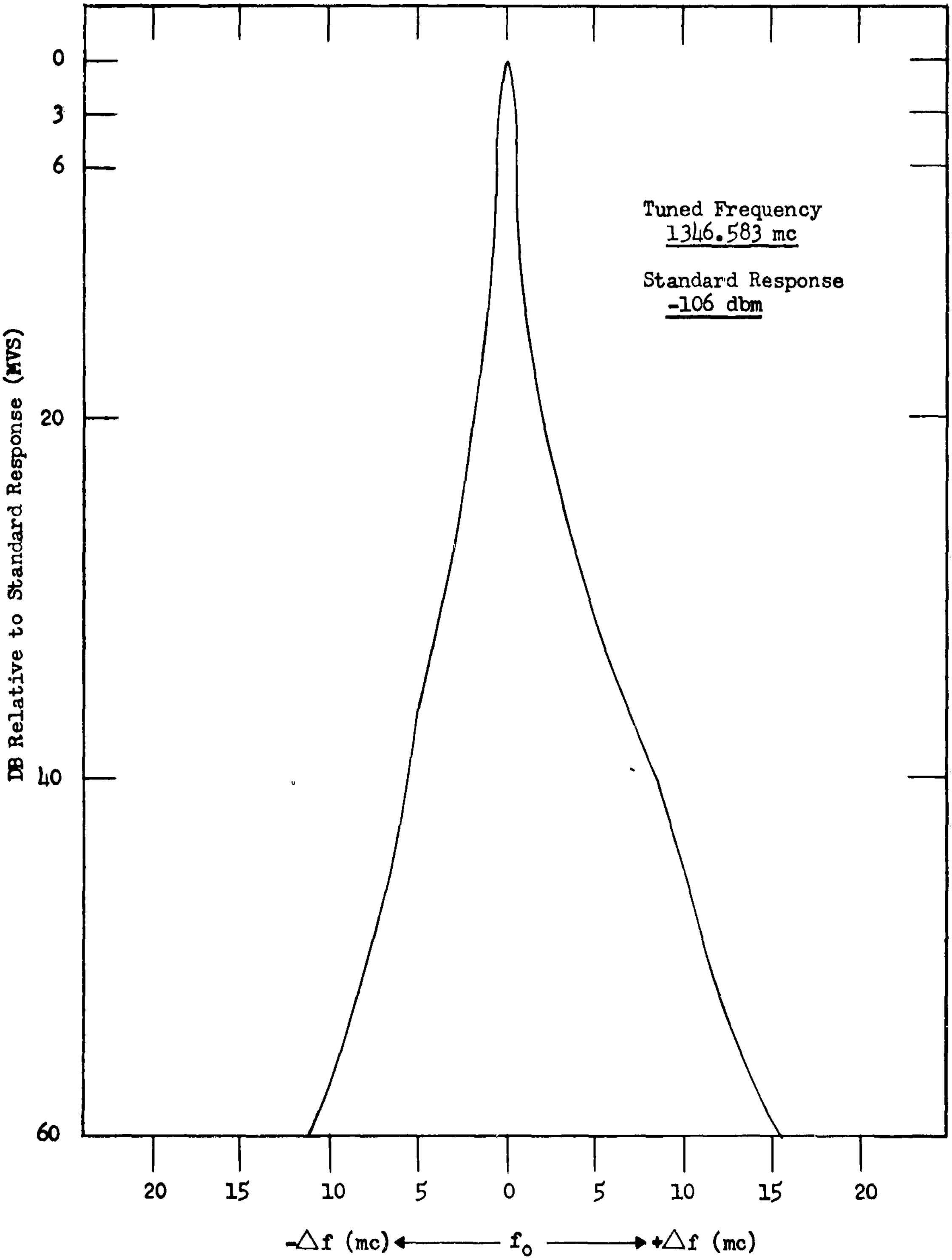


Figure 3.3.5.33 MTI Receiver Selectivity Curve - 6.0 usec Pulse

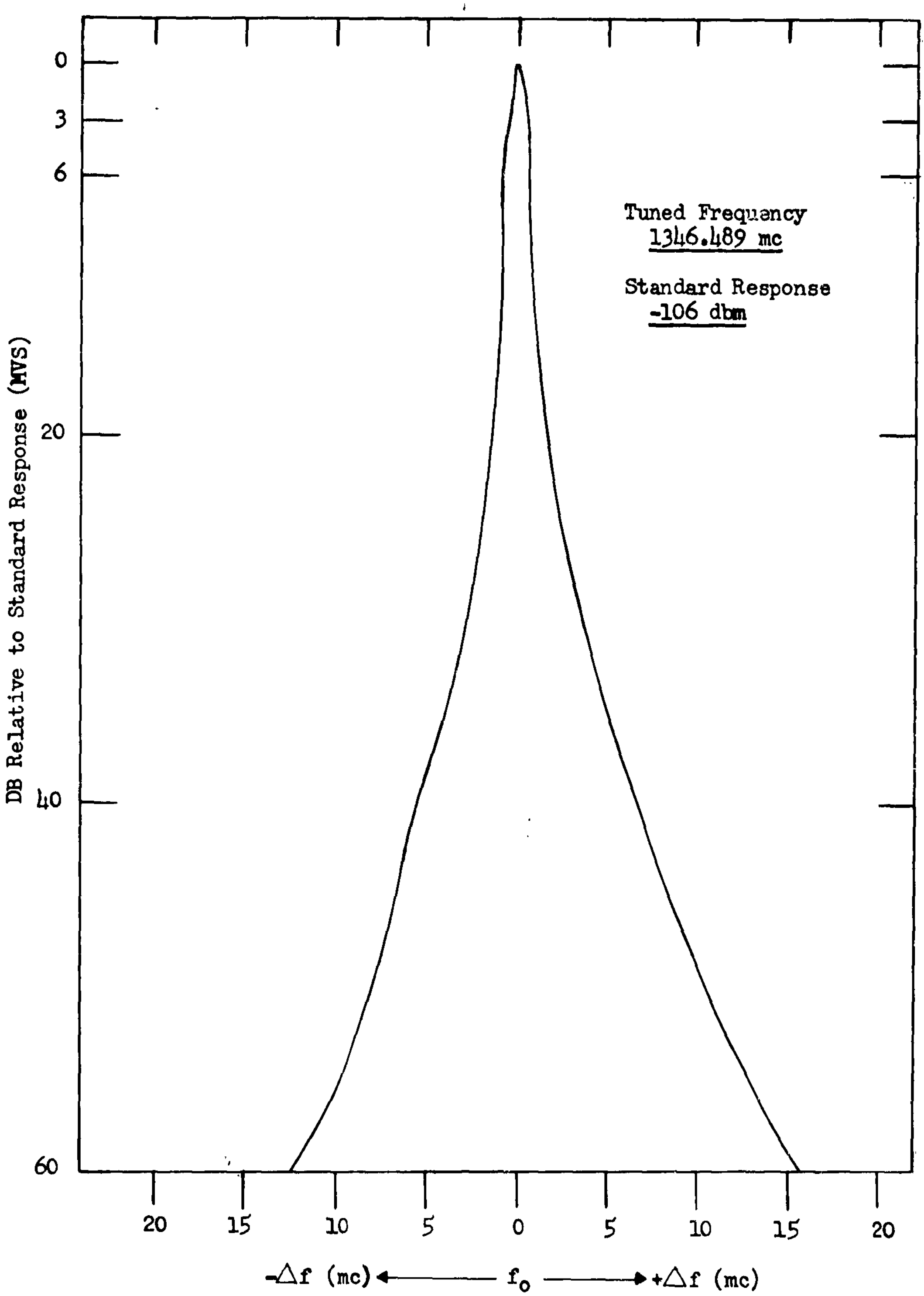


Figure 3.3.5.34 MTI Receiver Selectivity Curve - 9.0 usec Pulse

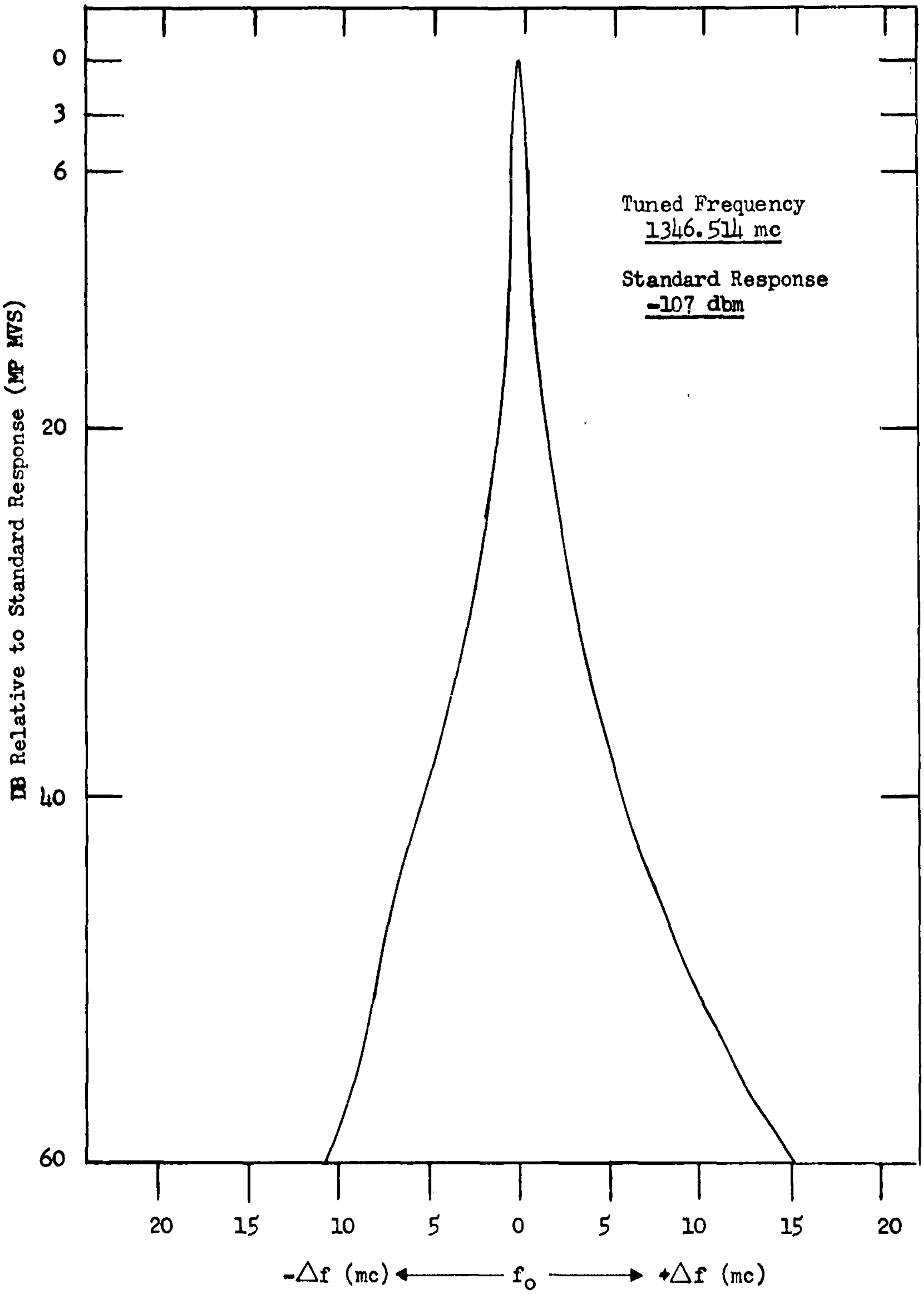


Figure 3.3.5.35 MTI Receiver Selectivity Curve - 15.0 usec Pulse

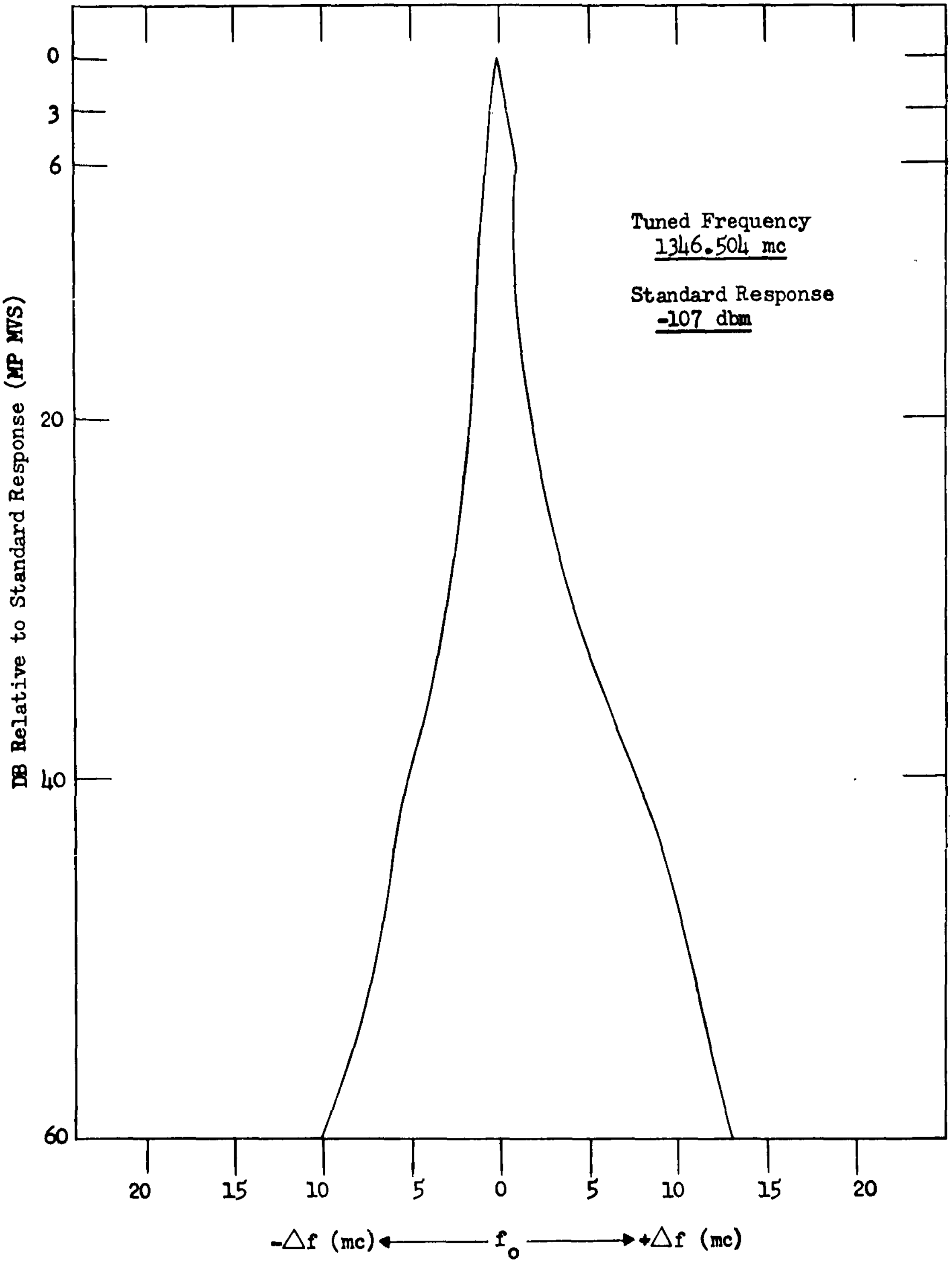
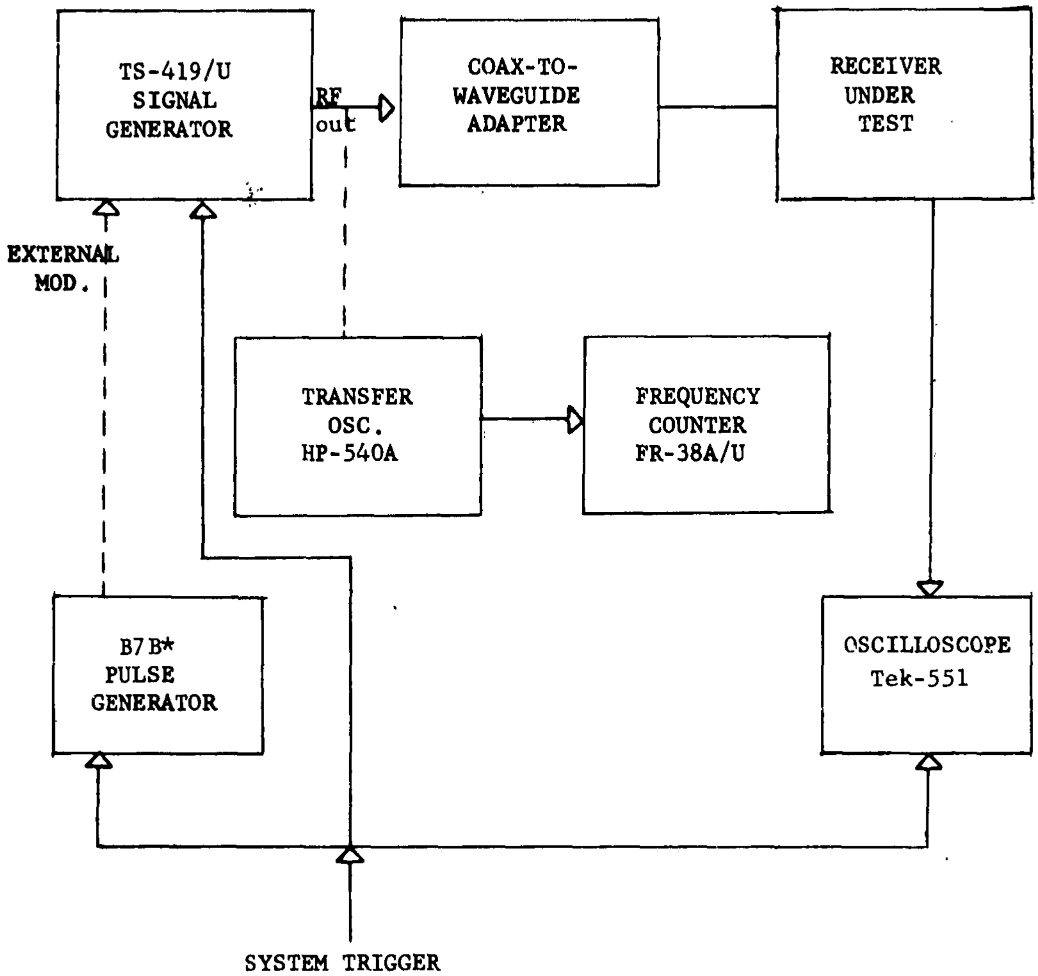


Figure 3.3.5.36 MTI Receiver Selectivity Curve - 30.0 usec Pulse



*NOTE- Pulse Generator used only for wide Pulse Widths.

Figure 3.3.5 Selectivity Test Block Diagram

3.3.6 Spurious Response

3.3.6.1 General Spurious responses occur when a receiver, due to its circuitry and construction, reacts to off-frequency signals. Spurious responses are often functions of internal frequencies inherent within the receiver, combining with an external signal to cause a response. These internal signals may be caused by harmonics of the oscillators in the receiver. This test is a measure of the receivers response to the external frequencies when considering the frequencies already present in the receiver.

3.3.6.2 Measurement Setup The test setup is shown in Figure 3.3.6. The signal generators were connected through low or high bandpass filters to a coax-to-waveguide adapter on the receiver under test. An oscilloscope was used at the video output of the receiver to measure the standard response. (MVS)

3.3.6.3 Procedure

a. The receiver was tuned to a standard test frequency and set for normal operation.

b. The signal generator was set for maximum power output with the modulation characteristics of the system under test.

c. Each signal generator as required was tuned from a lower frequency limit to the upper frequency limit to cover a 10 kc to 10 kmc. Signal generators and appropriate filters were changed to cover the required frequency range.

d. When a response was detected, the signal generator power necessary to cause a standard response (MVS) was recorded.

e. The frequency of the response was measured and recorded.

3.3.6.3 Procedure (Continued)

f. The attenuation due to the coax-to-waveguide adapter and cable losses were added to the signal generator reading giving a corrected power level.

3.3.6.4 Remarks

a. The asterisk in the Power Input column means the power levels were not recorded because the signal generator was operated above its calibration limits.

b. Power levels in data include loss due to out of band characteristics of coax-to-waveguide adapter.

c. The Coax-to-Waveguide Adapt Graph was derived by the Bendix Instrument Repair and Calibration Laboratory. Two identical coax-to-waveguide adapters were connected to a waveguide and a slotted line. A signal source was connected to one coax-to-waveguide adapter and the balometer was connected to the other coax-to-waveguide adapter. The balometer was also used for a direct reading of the signal source to be used for attenuation and VSWR correction as the frequency was changed and plotted. Then new graphs were plotted as the waveguide length was increased and the frequency of the signal source was increased. After numerous and direct substitutions were plotted, the final graph was the average attenuation of the coax-to-waveguide adapter over a frequency range of zero to 10 kmc. The first response was at 1.5 kmc. Figure 3.3.6.1 is the block diagram of the Coax-to-Waveguide Adapter Test setup.

3.3.6.5 **Data** **Date** 7 March 1962

Band L

Table I

Receiver Frequency 1283.5 mc
Stalo Frequency 1313.5 mc
Intermediate Frequency 30.0 mc

Spurious Frequency (mc)	Identification p	q	sign	Power Input (dbm)
1298.8	2	2	-	-55.0
1310.0	8	8	-	-45.0
1329.0	2	2	+	-32.0
1343.5	1	1	+	-78.0
2597.0	2	1	-	-27.5
2657.0	2	1	+	-31.0
3905.0	3	1	-	-29.7
3970.5	3	1	+	-25.2
4584.0	7	1	-	-17.5
5224.0	4	1	-	-33.2
5240.0	8	2	-	*
5269.0	8	2	+	*
5285.0	4	1	+	-54.5
5517.0	---	---	---	*
5624.0	---	---	---	*
5681.0	13	3	-	-13.7
5702.0	13	3	+	*
5920.0	18	4	+	*
6540.0	5	1	-	-42.0
6593.0	5	1	+	-38.5
9150.0	---	---	---	*
9215.0	14	2	+	*

* See Remarks (3.3.6.4)

3.3.6.5 Data (Continued)

Table II

Receiver Frequency 1314.8 mc
Stalo Frequency 1344.8 mc
Intermediate Frequency 30.0 mc

Spurious Frequency (mc)	Identification p	q	sign	Power Input (dbm)
1329.5	2	2	-	-49.0
1359.5	2	2	+	-26.0
1373.0	1	1	+	-77.5
2658.0	2	1	-	-16.5
2718.0	2	1	+	-10.0
4005.0	3	1	-	-33.2
4065.0	3	1	+	-29.5
5348.0	4	1	-	-57.6
5387.0	16	4	+	*
5392.0	8	2	-	*
5407.0	4	1	+	-58.2
5652.0	21	5	+	*
6687.0	5	1	+	-24.5
6745.0	5	1	-	*
9360.0	---	---	---	*

* See Remarks 3.3.6.4

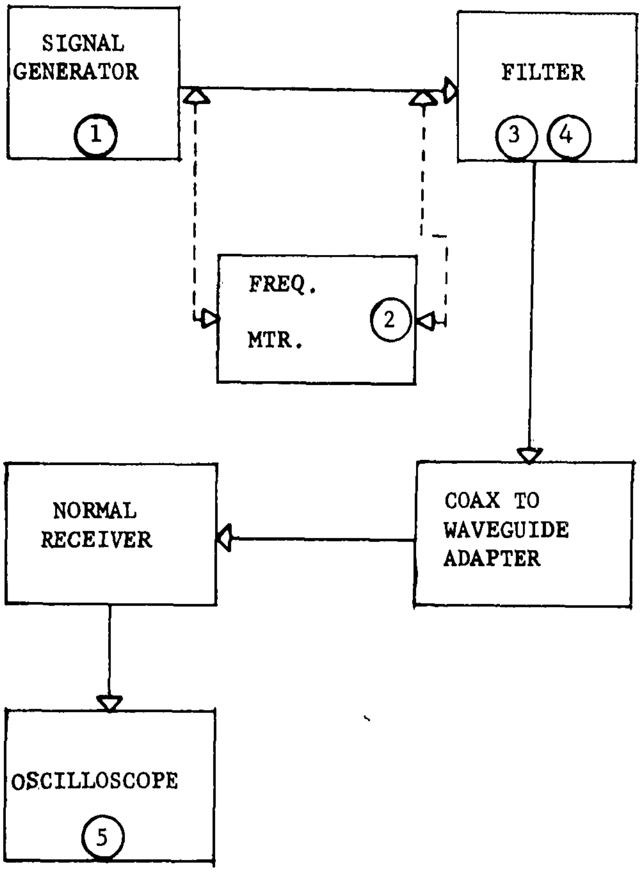
3.3.6.5 **Data (Continued)**

Table III

Receiver Frequency 1346.5 mc
Stalo Frequency 1316.5 mc
Intermediate Frequency 30.0 mc

Spurious Frequency (mc)	Identification p	q	sign	Power Input (dbm)
1286.5	1	1	-	-72.0
1322.5	4	4	+	-17.0
1322.0	2	2	+	-36.0
2603.0	2	1	-	-22.5
2663.0	2	1	+	-16.0
3919.0	3	1	-	-33.7
3981.0	3	1	+	-28.2
5237.0	4	1	-	-58.2
5298.0	4	1	+	-51.2
5648.0	---	---	---	*
5695.0	---	---	---	-15.3
5908.0	9	2	-	*
5940.0	9	2	+	*
6551.0	5	1	-	-28.4
6610.0	5	1	+	-32.5
9220.0	---	---	---	-43.4

* See Remarks 3.3.6.4



<u>Test Equipment Used</u>

1. Signal Generators
   a. MSG-1
   b. TS-419/U
   c. TS-621/U
   d. HP-612A
   e. TS-510/U
   f. TS-622/U
   g. Standard-65B

2. Frequency Meter
   a. FXR-N410A
   b. FXR-N414A

3. Filters;Bandpass
   a. Polarad-F-750
   b. Polarad-F-1180
   c. Polarad-F-2050
   d. Polarad-F-3550
   e. Polarad-F-6300

4. Filters;Lowpass
   a. Microlab-FL-301
   b. Microlab-FL-601
   c. Microlab-FL-801

5. Oscilloscope
   a. Tek-551

Figure 3.3.6 Spurious Response Test Block Diagram

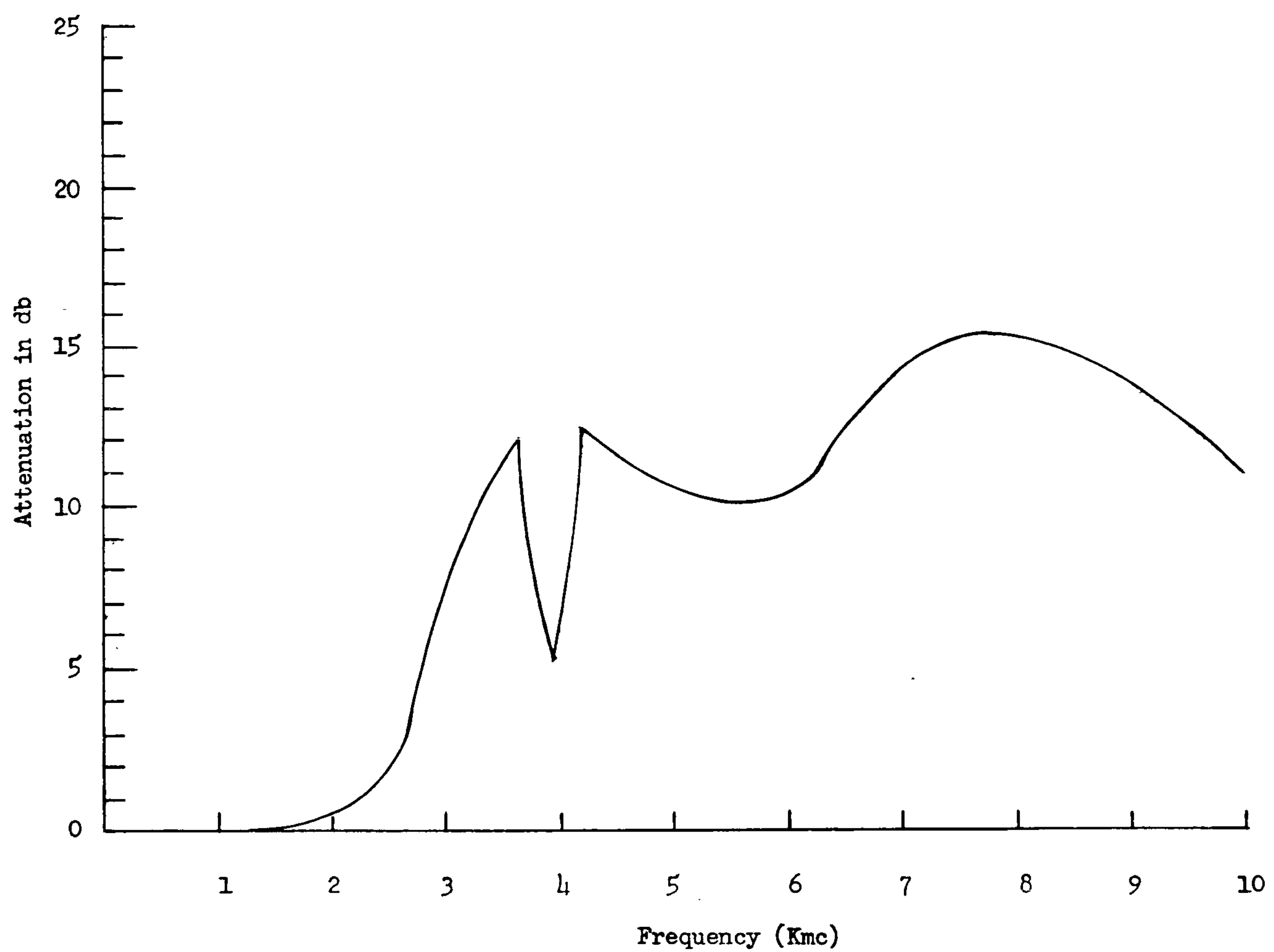


Figure 3.3.6.A Coax-to-Waveguide Adapter Calibration Curve

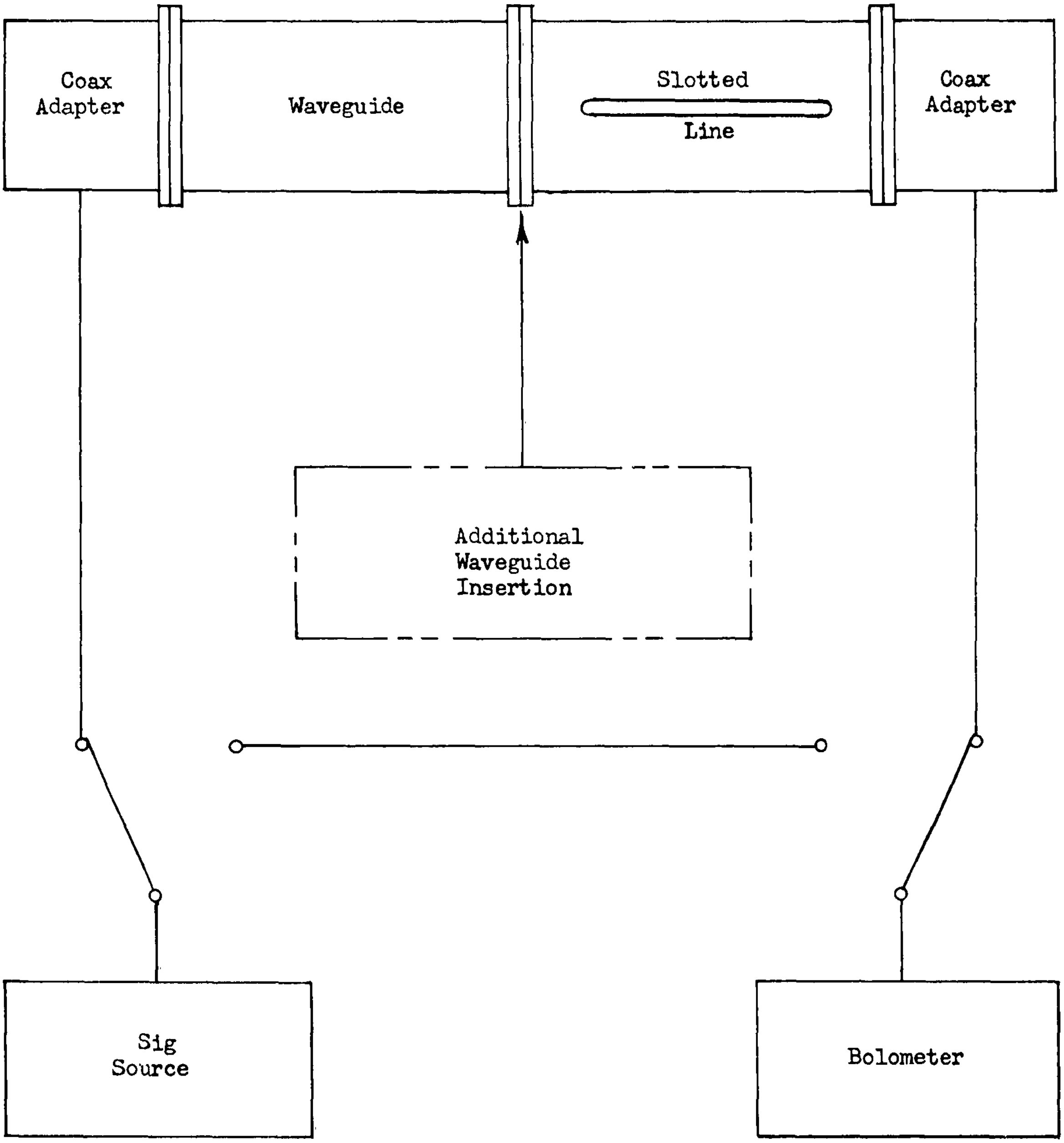


Figure 3.3.6.B Coax-to-Waveguide Adapter Calibration Test Block Diagram

3.3.7 Overall Susceptibility

3.3.7.1 General The purpose of this test is to determine the susceptibility of the entire receiving system at representative receiver spurious frequencies. This test utilizes the antenna, the transmission line and the previously tested receiver. The receiver spurious response frequencies as determined in paragraph 3.3.6 are for these measurements.

3.3.7.2 Measurement Setup Tests were first begun on the AN/FPS-8. The site layout is shown in Figure 3.3.7.1. The test equipment is shown in Figure 3.3.7. The signal source used was a fixed power output transmitter, with a modulated CW signal. The transmitting antennas used were circularly polarized with a relatively constant gain of 11.3 db. The FIM used, as shown in Figure 3.3.7 was the NF-112 and its associated tuning heads.

3.3.7.3 Procedure

a. A Field Intensity Meter was set up with a test antenna erected adjacent to and at the same elevation as the antenna under test.
b. The field strength of the test signal was measured and recorded.
c. The Field Intensity Meter was then connected through a coax-to-waveguide adapter to the waveguide of the radar antenna.
d. The field strength of the test signal at that point was measured and recorded.
e. The difference between the two signals was the gain or loss of the antenna and transmission system.

3.3.7.3 Procedure (Continued)

f. When the test antenna gain was greater than the cable loss (in db), the difference indicated that the amount of power (in dbm) measured at the FIM was more than the power actually received at the test antenna. Conversely, if the known cable loss exceeded the test antenna gain, the power measured at the FIM was less than the power actually delivered to the test antenna. These corrections had to be applied to the test antenna received power.

g. The power received at the radar antenna was measured through a coax-to-waveguide adapter, for which a calibration curve was obtained, Figure 3.3.6A. The correction indicated on the calibration curve for various frequencies were added to the measured power received at the radar antenna.

h. The gain of the radar antenna was calculated from the difference in the corrected received powers of the test antenna and the radar system, plus the known cable losses and the calibration gain of the test antenna. With this gain known, the signal strength of the various responses could be used to calculate the apparent power density at the radar system antenna which is necessary to cause the receiver to respond.

i. The method described above was performed at a distance of 1539 meters using a circularly polarized transmitting antenna having a gain of 11.3 db. The results of this test are shown in 3.3.7.5 (Data).

3.3.7.4 Remarks

a. The antenna of the system under test has a large aperture and encompasses a wavefront that is a large number of wave-lengths in area. In the usual environment at an operational radar site, any signal source that is not at a high elevation, such as an airborneradar set, is subject to many reflections. These reflections arrive at the antenna at various phase angles relative to the direct radiation and thus make it impossible to uniformly illuminate the large aperture of the antenna under test. The data gathered in this series of tests indicated the following:

   (1) Any signal subject to ground environment will present far less effective gain on a large aperture antenna due to non-uniform illumination of the area involved.

   (2) The exact effective gain of each signal is dependent upon its position in the environment and varies according to the number of reflections created over the area involved.

   (3) The present experimental results must be considered only as representative of a signal at a specific location and time.

b. The data has been presented in terms of antenna gain. The calculations of power densities were not performed because of the inconsistent gain figure.

3.3.7.5 Data Date 10 August 1962

Band L

Measurement Distance 1539 meters
Signal Source Antenna Polarization Circular
Signal Source Antenna Gain 11.3 db.

Frequency (mc)	Test Ant. Rec. Pwr. (dbm)	Radar Ant. Rec. Pwr. (dbm)	Signal Source Output (dbm)	Radar Ant. Gain (db)
1283.5	-40.8	-27.1	+52.8	13.7
1315.0	-40.6	-27.3	+53.6	13.3
1343.5	-40.7	-26.8	+52.9	13.9
1375.0	-40.7	-25.3	+53.3	15.4
2658.0	-47.9	-33.8	+52.4	14.1
2663.0	-47.9	-35.8	+52.4	12.1
3905.0	-51.2	-26.8	+51.5	24.4
3981.0	-51.2	-26.3	+51.5	24.9
4005.0	-51.2	-28.3	+52.3	22.9
5224.0	-43.0	-27.8	+52.6	15.2
5298.0	-43.0	-24.3	+52.4	18.7
5348.0	-43.0	-22.3	+52.3	20.7
6540.0	-54.5	-24.3	+51.0	30.2
6610.0	-54.5	-21.8	+51.0	32.7
6687.0	-54.5	-23.3	+51.0	31.2
9150.0	-68.8	-25.3	+49.0	43.5
9220.0	-68.8	-27.8	+49.0	41.0
9360.0	-68.8	-28.8	+48.3	40.0

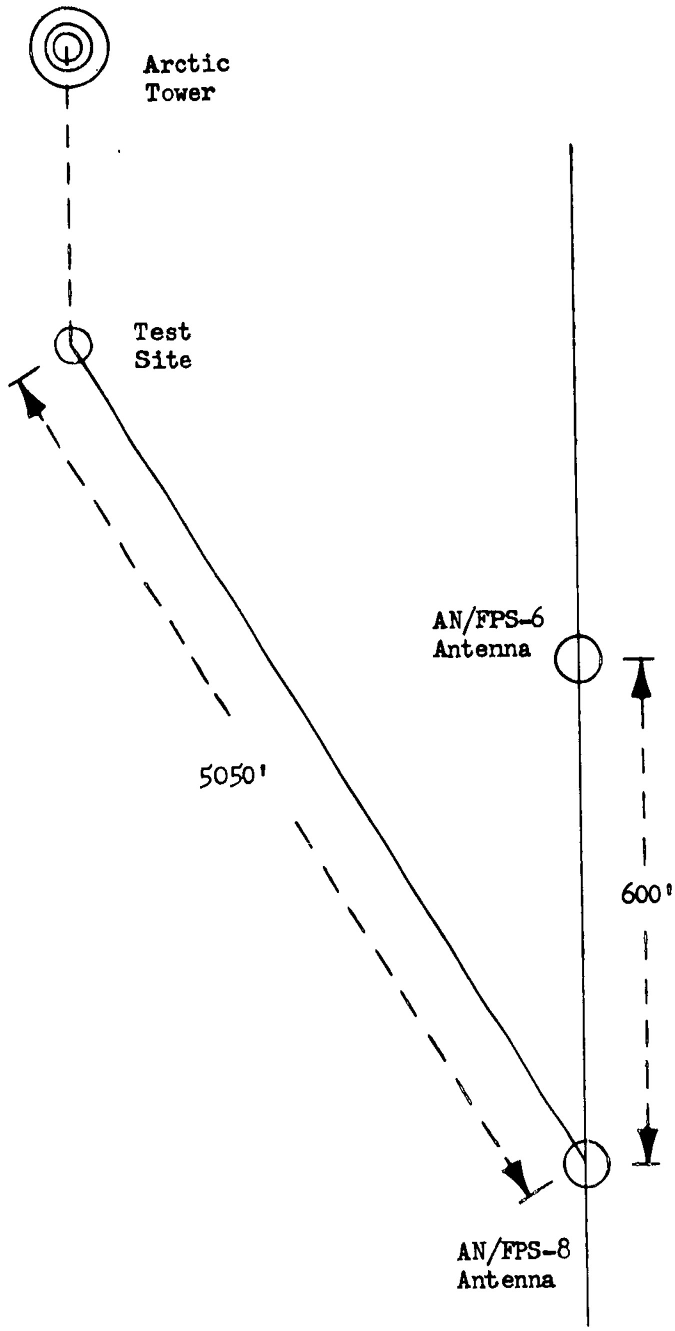


Figure 3.3.7.1 Site for Overall Susceptibility

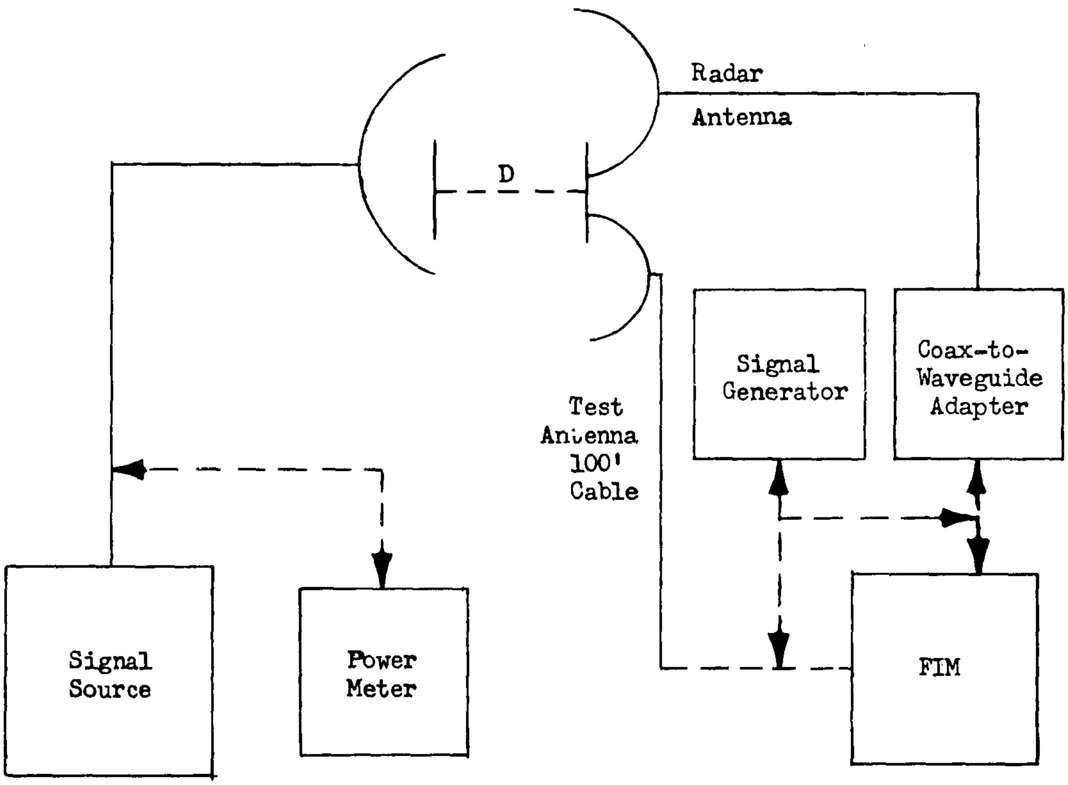


Figure 3.3.7.2   Overall Susceptibility Test Block Diagram

3.3.8 Intermodulation Test

3.3.8.1 General The intermodulation characteristics of receivers are of primary importance because they are indicative of the interference potential of the receiver when in the presence of off-channel signals. Assuming that these signals have not been mixed before arriving at the receiver, some mixing can be expected in the r-f amplifier and/or the first mixer circuits. If one of the extraneous signals generated in this manner happens to fall at the receiver tuned frequency, then interference of a co-channel nature is the result.

The third order modulation is potentially the most serious type of intermodulation, but the primary and fifth order cannot be neglected.

This test is designed to measure the primary, third and fifth order intermodulation characteristics.

3.3.8.2 Measurement Setup The test setup is shown in Figure 3.3.8. Two signal generators were used to generate the signals that were needed. These signals were isolated from each other by a power divider and then fed through a coax-to-waveguide adapter to the preamplifier of the receiver. An oscilloscope was used to monitor the receiver's video output.

3.3.8.3 Procedure

a. The receiver was tuned to a standard test frequency.

b. Both signal generators were set for CW operation with maximum equal outputs.

3.3.8.3 Procedure (Continued)

c. The signal generators were tuned for primary mixing where $f_o = f_a - f_b$, where f_o is the receiver tuned frequency and f_a and f_b are other frequencies whose difference equals f_o.

d. When a response was noticed, one signal generator f_a was set for the desired modulation characteristics, then both signal generator outputs were adjusted equally to give a standard response (MVS).

e. The validity of the intermodulation was checked by removing first f_a signal generator, reconnecting f_a and then disconnecting f_b signal generator. If the response were true intermodulation, it would be noticed only with both signal generators connected.

f. The frequencies that caused a response were measured and recorded.

g. This was repeated for a set of frequencies (f_a and f_b) that would give enough points to establish a curve.

h. This procedure was repeated for third order mixing where $f_o = 2f_a - f_b$ and the responses recorded.

i. This procedure was repeated for fifth order mixing where $f_o = 3f_a - 2f_b$ and the responses recorded.

j. This test was repeated for all standard test frequencies.

3.3.8.4 Remarks

a. No primary or fifth order mixing was observed.

b. The Δf recorded in the data column is difference between the receiver tuned frequency and f_a ($\Delta f = f_o - f_a$).

3.3.8.5 Data

Date 7 May 1962

Band L

Pulse Repetition Rate 360 pps

Pulse Width 3.0 usec

Receiver Tuned Frequency (mc) 1283.5

Receiver Standard Response (MVS) -105 dbm

Table I

Intermodulation Order	Frequency f_a (mc)	Frequency f_b (mc)	Δf (mc)	Power Input (dbm)
3rd Order	1294.0	1308.2	-10.5	-24.5
3rd Order	1296.5	1309.8	-13.0	-20.5
3rd Order	1297.3	1311.6	-13.8	-19.5
3rd Order	1299.2	1313.4	-15.7	-18.5
3rd Order	1299.5	1315.6	-16.0	-21.5
3rd Order	1300.5	1317.8	-17.0	-21.5
3rd Order	1301.6	1320.2	-18.1	-20.5
3rd Order	1271.1	1260.9	+12.4	-35.5
3rd Order	1265.4	1247.9	+18.1	-31.5
3rd Order	1263.5	1243.8	+20.0	-30.0
3rd Order	1262.2	1241.2	+21.3	-28.5
3rd Order	1261.3	1239.3	+22.2	-27.0
3rd Order	1260.3	1237.5	+23.2	-26.0
3rd Order	1259.8	1236.2	+23.7	-25.5

3.3.8.5 **Data** **Date** 7 May 1962

Band L

Receiver Tuned Frequency (mc) 1315.5

Receiver Standard Response (MVS) -106 dbm

Table II

Intermodulation Order	Frequency f_a (mc)	Frequency f_b (mc)	Δf (mc)	Power Input (dbm)
3rd Order	1326.9	1339.5	-11.4	-32.5
3rd Order	1329.5	1346.7	-14.0	-29.5
3rd Order	1332.5	1350.5	-17.0	-27.5
3rd Order	1334.3	1353.0	-18.8	-24.5
3rd Order	1335.7	1356.2	-20.2	-23.5
3rd Order	1336.9	1358.4	-21.4	-22.5
3rd Order	1337.4	1359.6	-21.9	-21.5
3rd Order	1302.4	1289.9	+13.1	-26.5
3rd Order	1301.6	1288.2	+13.9	-23.5
3rd Order	1301.2	1287.4	+14.3	-24.5
3rd Order	1300.7	1286.5	+14.8	-23.5
3rd Order	1300.2	1285.4	+15.3	-24.5
3rd Order	1298.6	1282.4	+16.9	-23.5
3rd Order	1297.0	1279.1	+18.5	-24.5
3rd Order	1295.9	1276.5	+19.6	-24.5
3rd Order	1293.7	1272.6	+21.8	-24.5

3.3.8.5 **Data** **Date** 7 May 1962

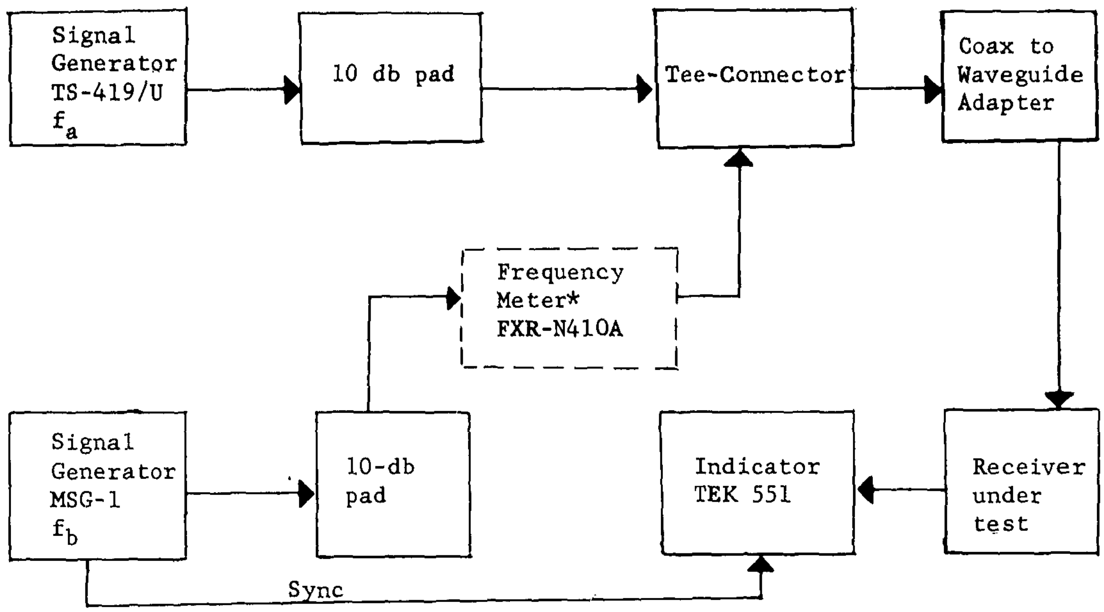
Band L

Receiver Tuned Frequency (mc) 1346.5

Receiver Standard Response (MVS) -107 dbm

Table III

Intermodulation Order	Frequency f_a (mc)	Frequency f_b (mc)	Δf (mc)	Power Input (dbm)
3rd Order	1374.8	1404.0	-28.3	-19.5
3rd Order	1375.7	1405.5	-29.2	-28.5
3rd Order	1377.6	1408.7	-31.1	-29.5
3rd Order	1380.1	1413.4	-33.6	-28.5
3rd Order	1381.5	1416.2	-35.0	-26.5
3rd Order	1383.4	1420.8	-36.9	-25.0
3rd Order	1385.2	1423.5	-38.7	-23.5
3rd Order	1386.3	1426.0	-39.8	-21.5
3rd Order	1333.2	1320.2	+13.3	-34.5
3rd Order	1309.9	1274.2	+36.6	-24.5
3rd Order	1309.2	1272.7	+37.3	-24.5
3rd Order	1308.5	1271.2	+38.0	-23.5
3rd Order	1308.0	1270.2	+38.5	-22.5
3rd Order	1307.4	1269.0	+39.1	-22.5
3rd Order	1306.7	1267.7	+39.8	-22.5



* Frequency meter inserted only to measure frequency.

Figure 3.3.8 Block Diagram for Receiver Intermodulation Test

3.3.9 Adjacent Signal Interference

3.3.9.1 General The two-signal adjacent frequency test is a measure of the response of a receiver to weak and strong desired signals in the presence of weak and strong off-frequency interfering signals. Interference to the desired signal may be simultaneously due to one or more of the following causes: cross-modulation, spurious responses and receiver desensitization. This test is a measure of the ability of the receiver to perform its normal function despite these forms of interference.

3.3.9.2 Measurement Setup The test setup is shown in figure 3.3.9. The desired signal, receiver and indicator were synchronized with the system sync. The undesired signal was CW and the desired signal was modulated with the systems normal modulation characteristics.

3.3.9.3 Procedure

(a) The desired signal was tuned to the center frequency of the receiver under test. A 6-db attenuator was added and the standard response (MVS) was obtained.

(b) The 6-db attenuator was removed and the undesired signal was connected and set approximately 10 mc below center frequency, at a maximum output level.

(c) The undesired signal was tuned towards center frequency until the desired signal decreased to the standard response level (MVS). The frequency was measured and recorded.

3.3.9.3 Procedure (Continued)

(d) The 6-db attenuator was reinserted in the desired signal path and the desired signal generator was increased to a standard response. The output level, now +12 db from MVS, was recorded and the 6 db was again removed.

(e) The frequency of interfering signal was increased until a standard response (MVS) was again obtained. This frequency was measured and recorded.

(f) Steps (b) thru (e) were repeated adding approximately 6 db to the desired signal each time until the interfering signal equaled the center frequency of the receiver.

(g) Steps (a) thru (f) were repeated with the interfering signal generator tuned approximately 10 mc. above the center frequency.

(h) The entire test was repeated setting the interfering signal generator for output levels of -6, -12, and -30 dbm.

3.3.9.4 Remarks

(a) Maximum power available at receiver input for undesired signal was -13.5 dbm due to necessary coupling network.

(b) Frequency measurements were made with a FXR-N410A frequency meter of .01% accuracy.

(c) The NORMAL and MTI standard response was found to change daily as much as 3 or 4 db. This may have been caused by the number of organizations working on the radar system in a 24 hour day. Each measurement taken has the standard response (MVS) recorded at that date. The response would remain consistent throughout a working period of 8 hours.

3.3.9.5 Data Date 29 March 1962

Band L

NORMAL RECEIVER

Receiver Tuned Frequency 1315.5 mc

Standard Response (MVS) -107 dbm

Desired Signal Power (dbm)	Undesired Signal Power (dbm)	$-\Delta f$ (mc)	$+\Delta f$ (mc)
-101	-13.5	2.8	3.1
- 95	-13.5	2.3	2.3
- 89	-13.5	2.0	1.6
- 83	-13.5	1.4	0.8
- 77	-13.5	0.3	0.3
- 71	-13.5	0	0
-101	-19.5	2.3	2.1
- 95	-19.5	1.7	1.2
- 89	-19.5	1.2	0.8
- 83	-19.5	0	0
-101	-25.5	3.3	2.1
- 95	-25.5	2.8	1.3
- 89	-25.5	2.2	0.7
- 83	-25.5	1.3	0
- 77	-25.5	0	
-101	-43.5	2.7	1.2
- 95	-43.5	2.0	0.6
- 89	-43.5	1.2	0.2
- 83	-43.5	0.3	0
- 77	-43.5	0	

3.3.9.5 **Data** (Continued) **Date** 23 March 1962

MTI RECEIVER
Table I

Receiver Tuned Frequency 1314.0 mc
Standard Response (MVS) -101 dbm

Desired Signal Power (dbm)	Undesired Signal Power (dbm)	$-\Delta f$ (mc)	$+\Delta f$ (mc)
-95	-13.5	6.0	3.7
-89	-13.5	5.1	3.1
-83	-13.5	4.2	2.2
-77	-13.5	4.0	1.1
-71	-13.5	2.8	0.7
-65	-13.5	2.1	0.4
-59	-13.5	1.8	0.2
-53	-13.5	0.5	0
-47	-13.5	0	0

Table II **Date** 26 March 1962

Receiver Tuned Frequency 1315.0 mc
Standard Response (MVS) -104 dbm

Desired Signal Power (dbm)	Undesired Signal Power (dbm)	$-\Delta f$ (mc)	$+\Delta f$ (mc)
-98	-19.5	5.0	3.2
-92	-19.5	4.3	3.0
-86	-19.5	3.4	2.5
-80	-19.5	2.5	2.0
-74	-19.5	2.0	1.0
-68	-19.5	0.5	0.5
-62	-19.5	0.3	0.2
-56	-19.5	0	0
-98	-25.5	4.5	3.0
-92	-25.5	3.8	2.7
-86	-25.5	3.3	2.2
-80	-25.5	2.2	2.0
-74	-25.5	1.5	0.9
-68	-25.5	0.5	0.3
-62	-25.5	0.2	0.2
-56	-25.5	0	0
-98	-43.5	3.2	2.5
-92	-43.5	2.7	1.7
-86	-43.5	2.2	1.3
-80	-43.5	1.0	0.5
-74	-43.5	0.3	0.2
-68	-43.5	0	0

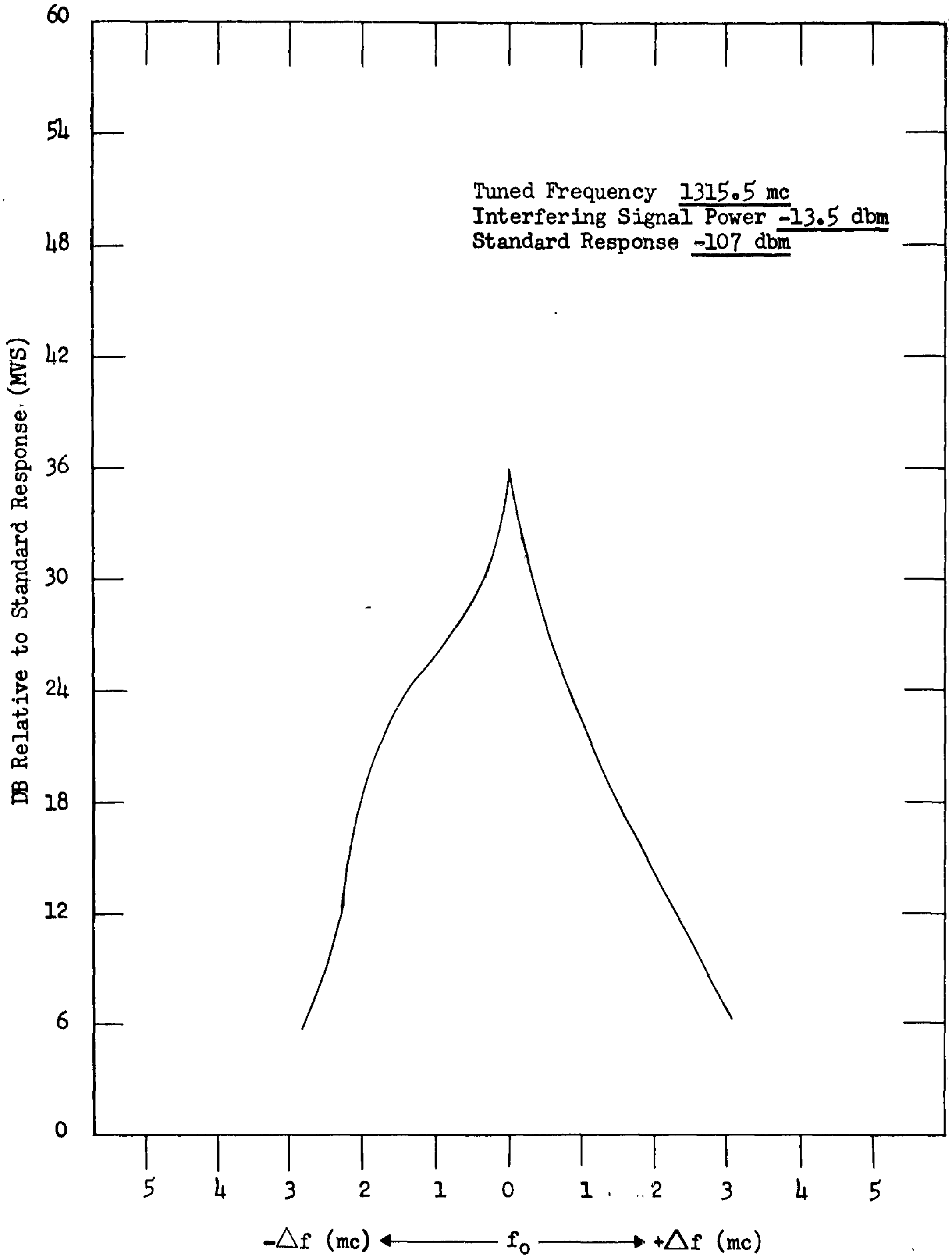


Figure 3.3.9.1 Normal Receiver Adjacent Signal Interference Curve

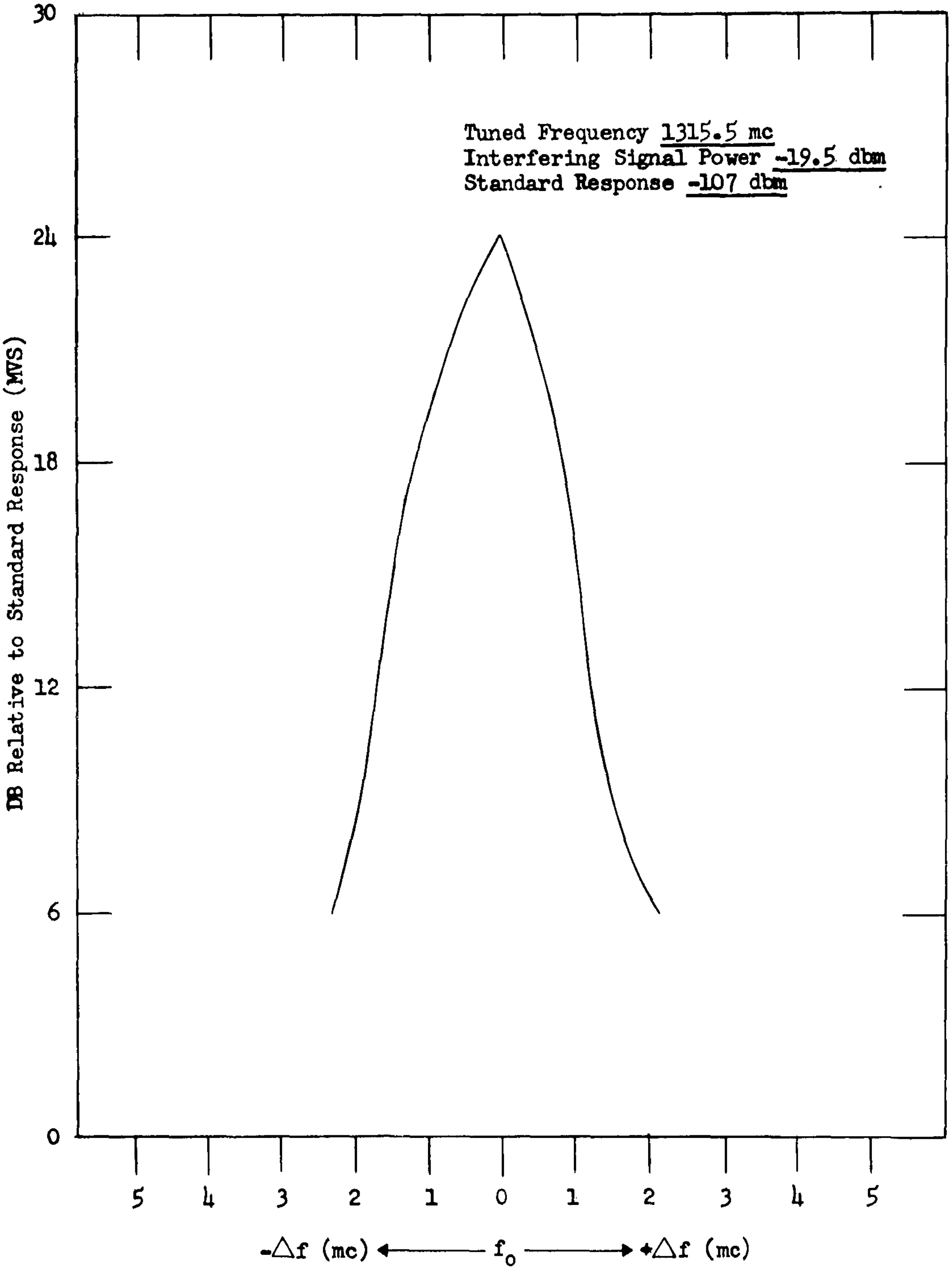


Figure 3.3.9.2 Normal Receiver Adjacent Signal Interference Curve

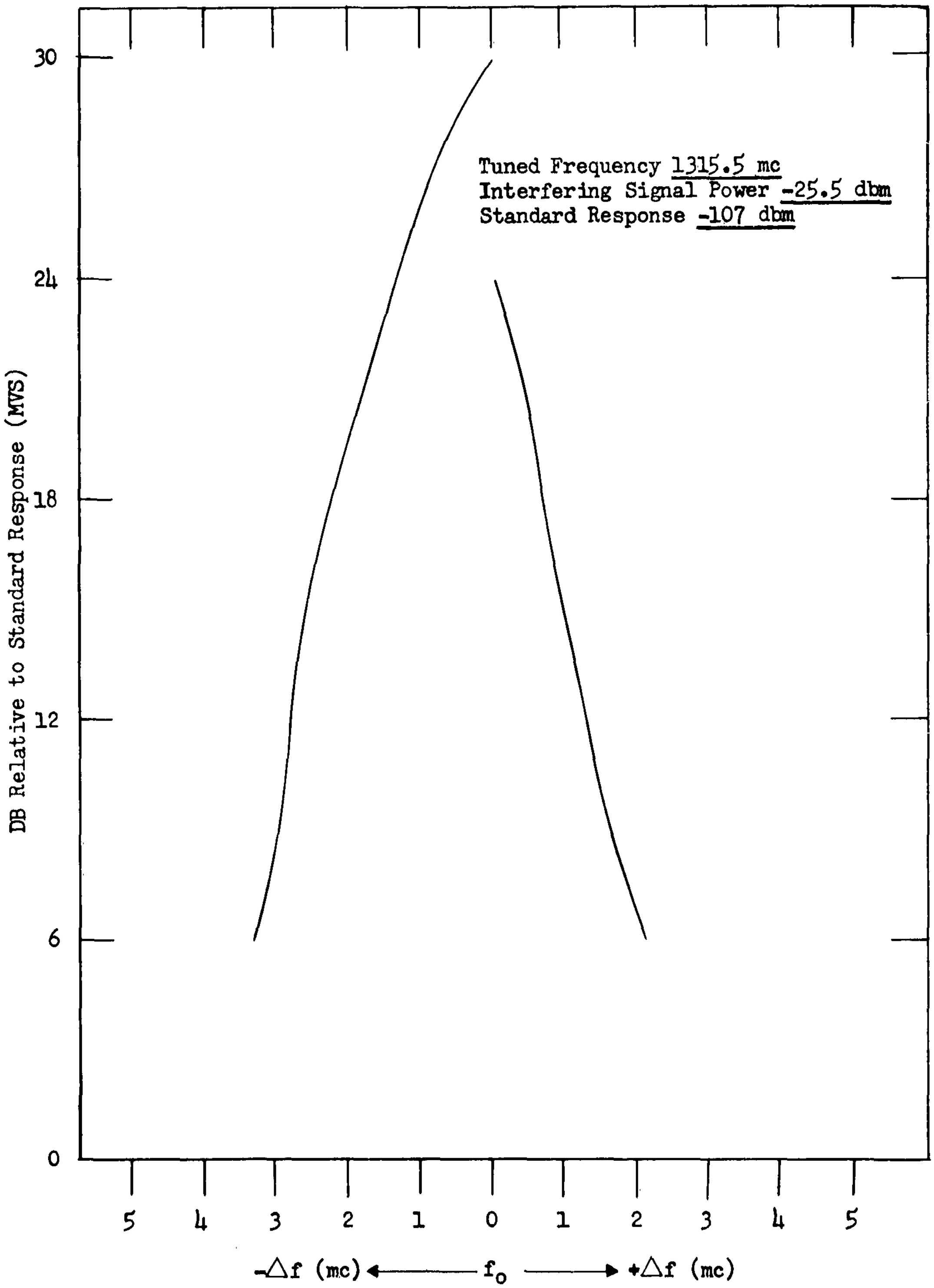


Figure 3.3.9.3 Normal Receiver Adjacent Signal Interference Curve

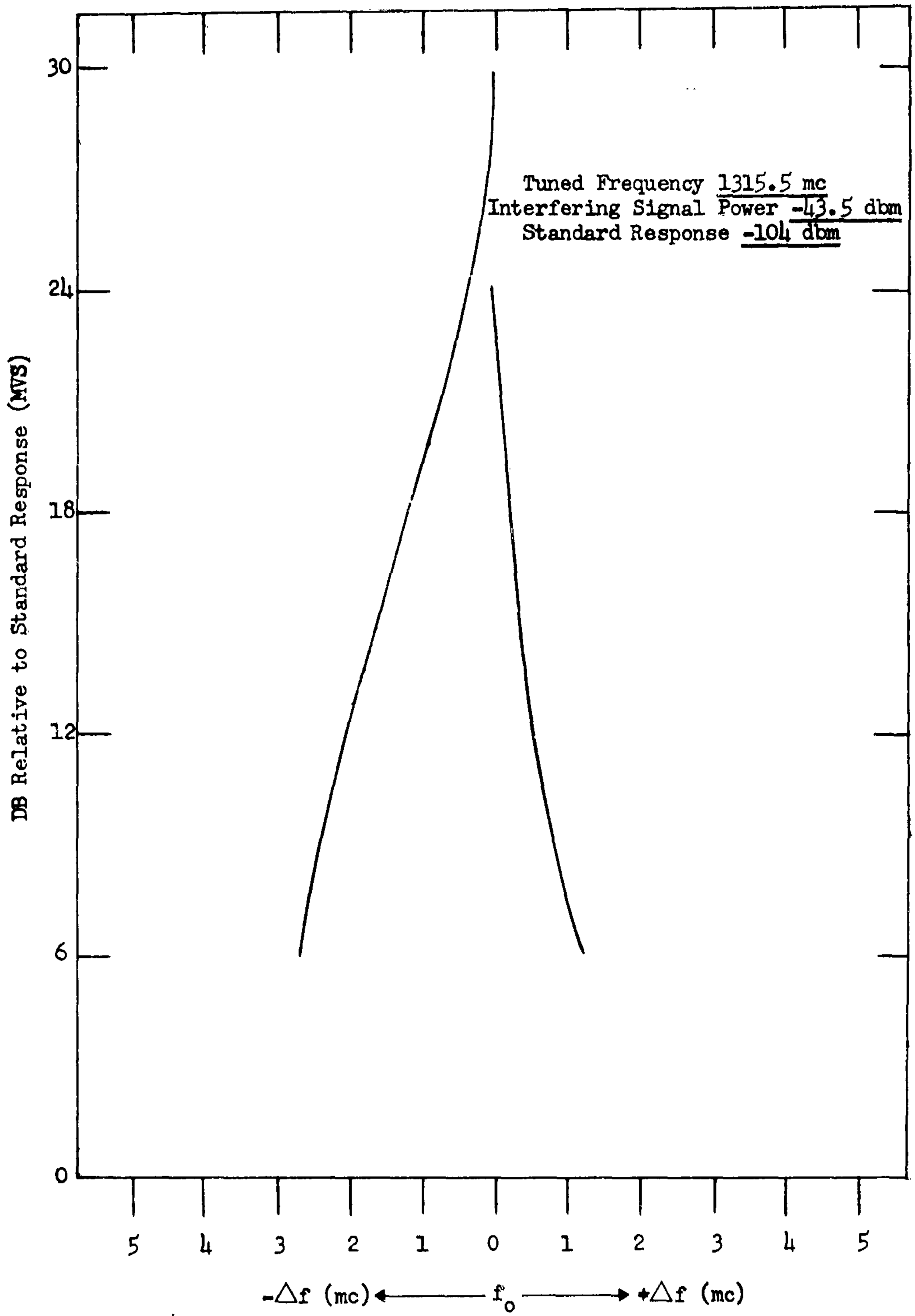


Figure 3.3.9.4 Normal Receiver Adjacent Signal Interference Curve

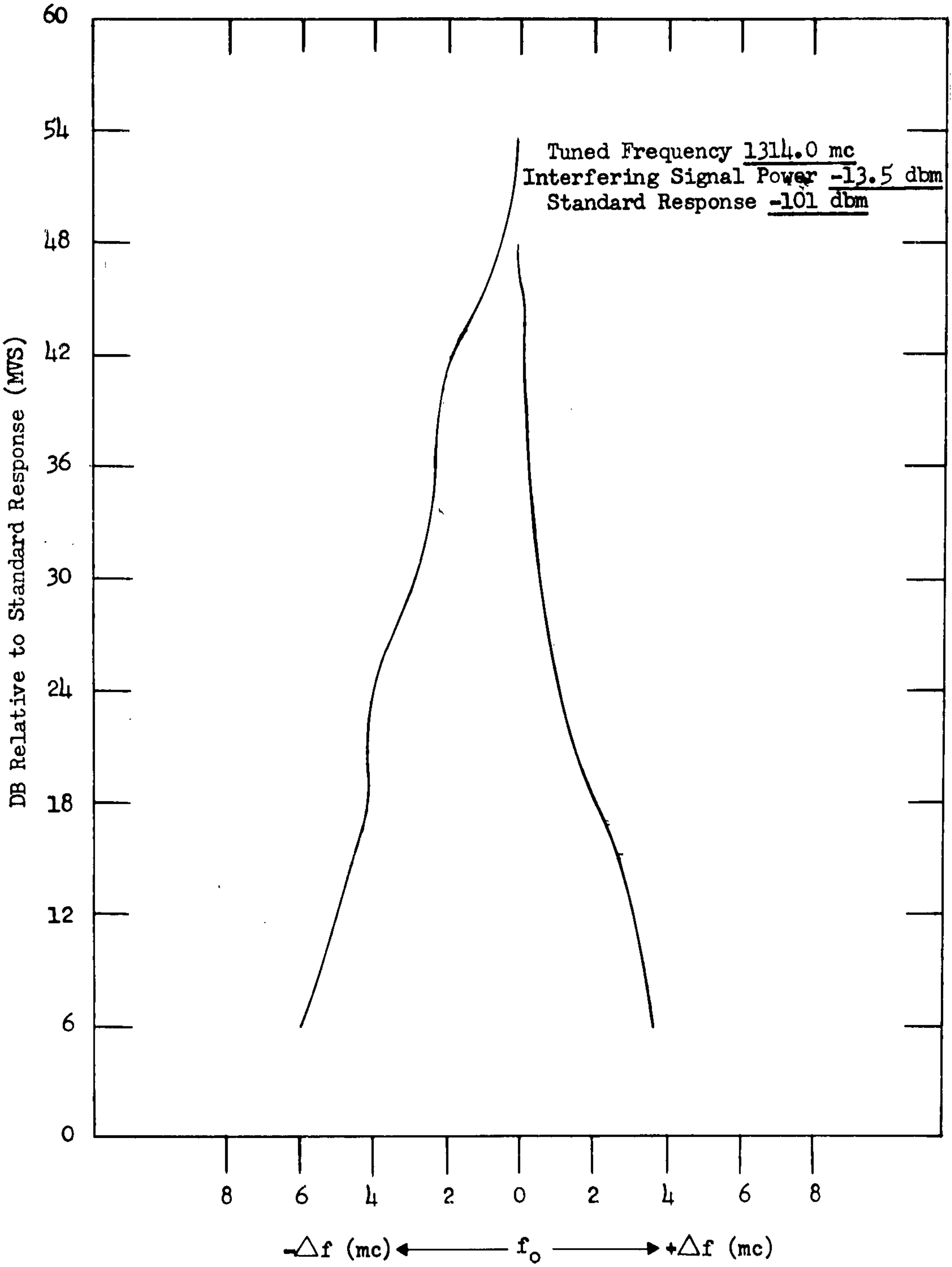


Figure 3.3.9.5 MTI Receiver Adjacent Signal Interference Curve

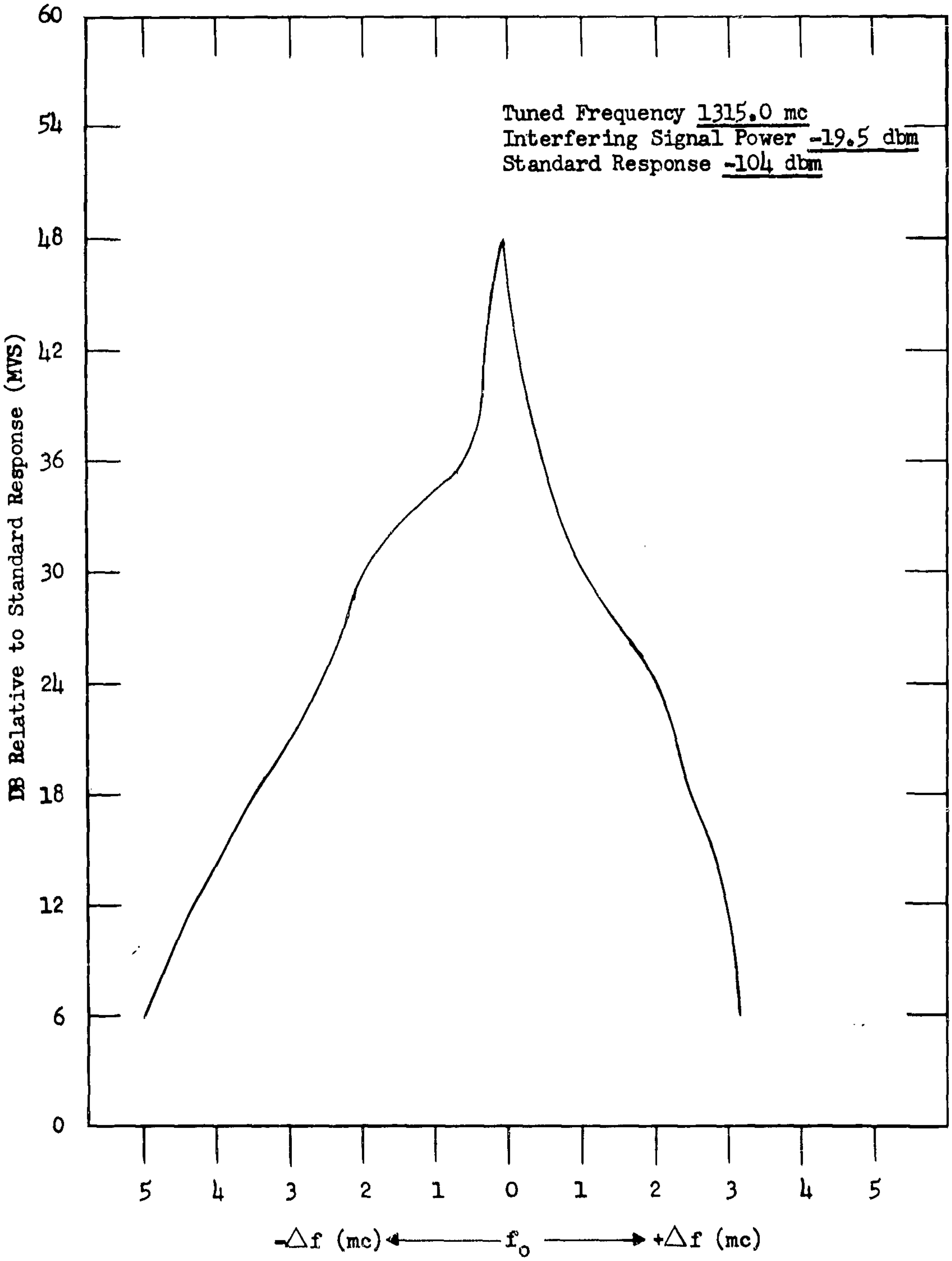


Figure 3.3.9.6 MTI Receiver Adjacent Signal Interference Curve

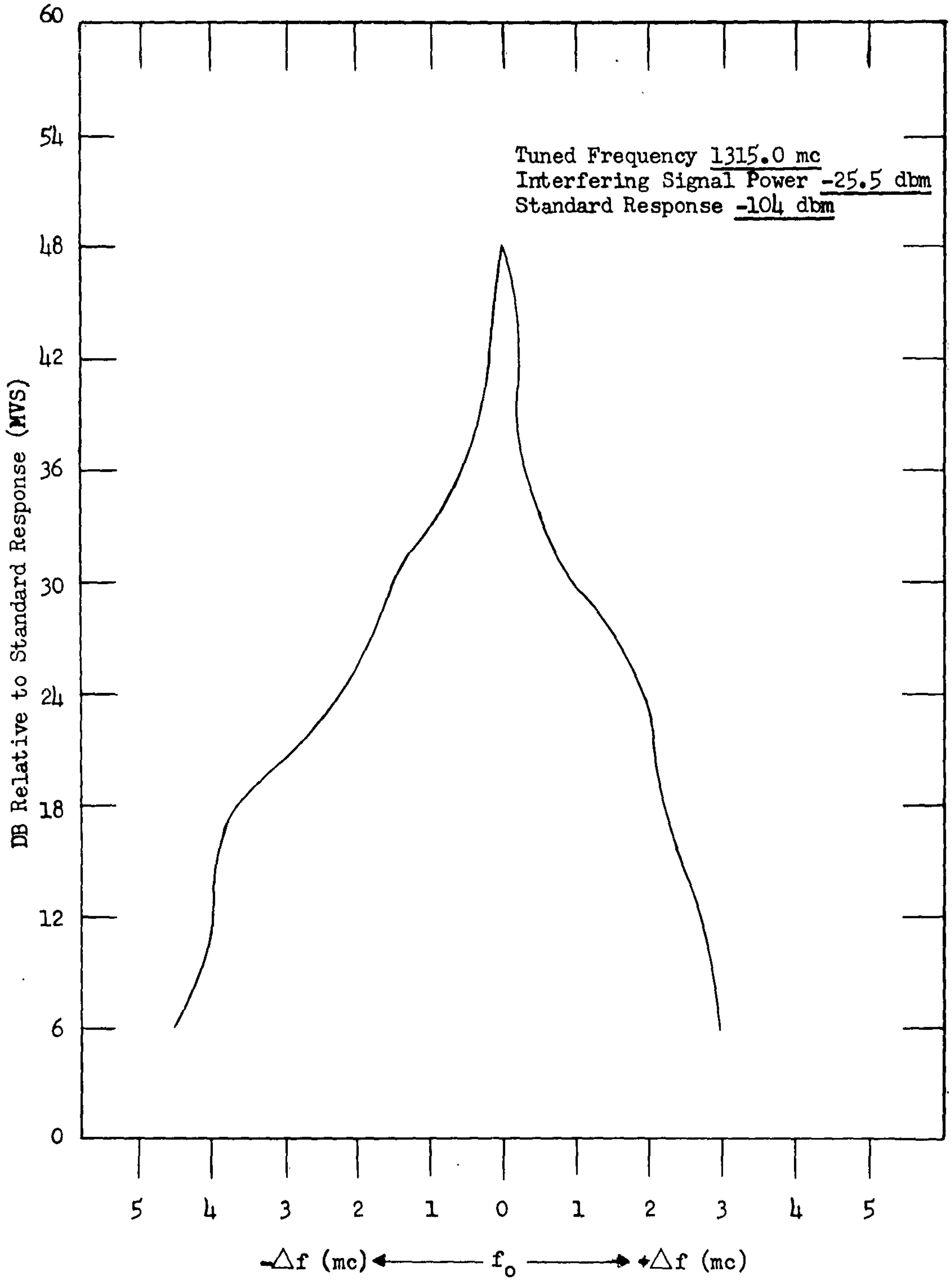


Figure 3.3.9.7 MTI Receiver Adjacent Signal Interference Curve

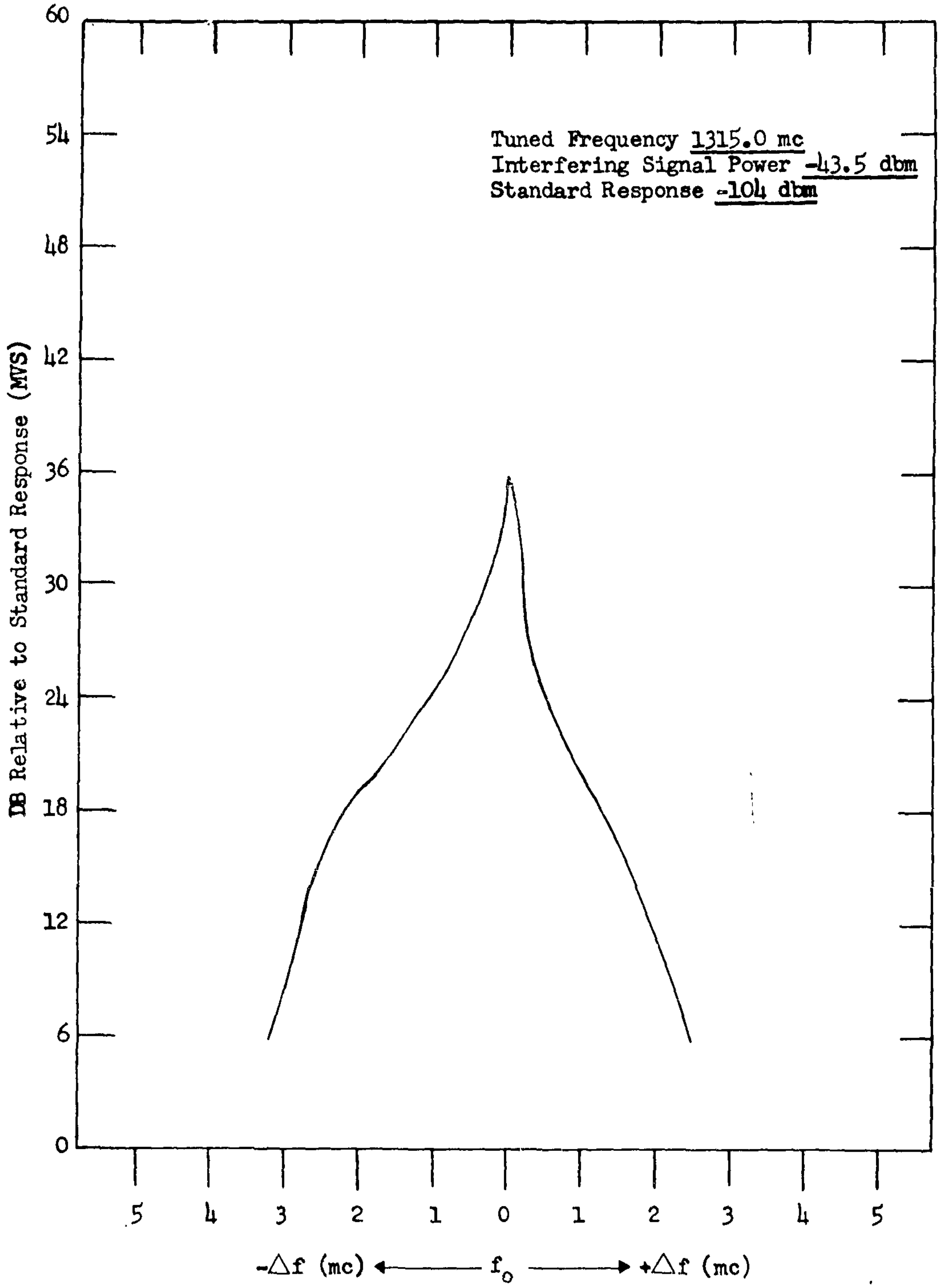


Figure 3.3.9.8 MTI Receiver Adjacent Signal Interference Curve

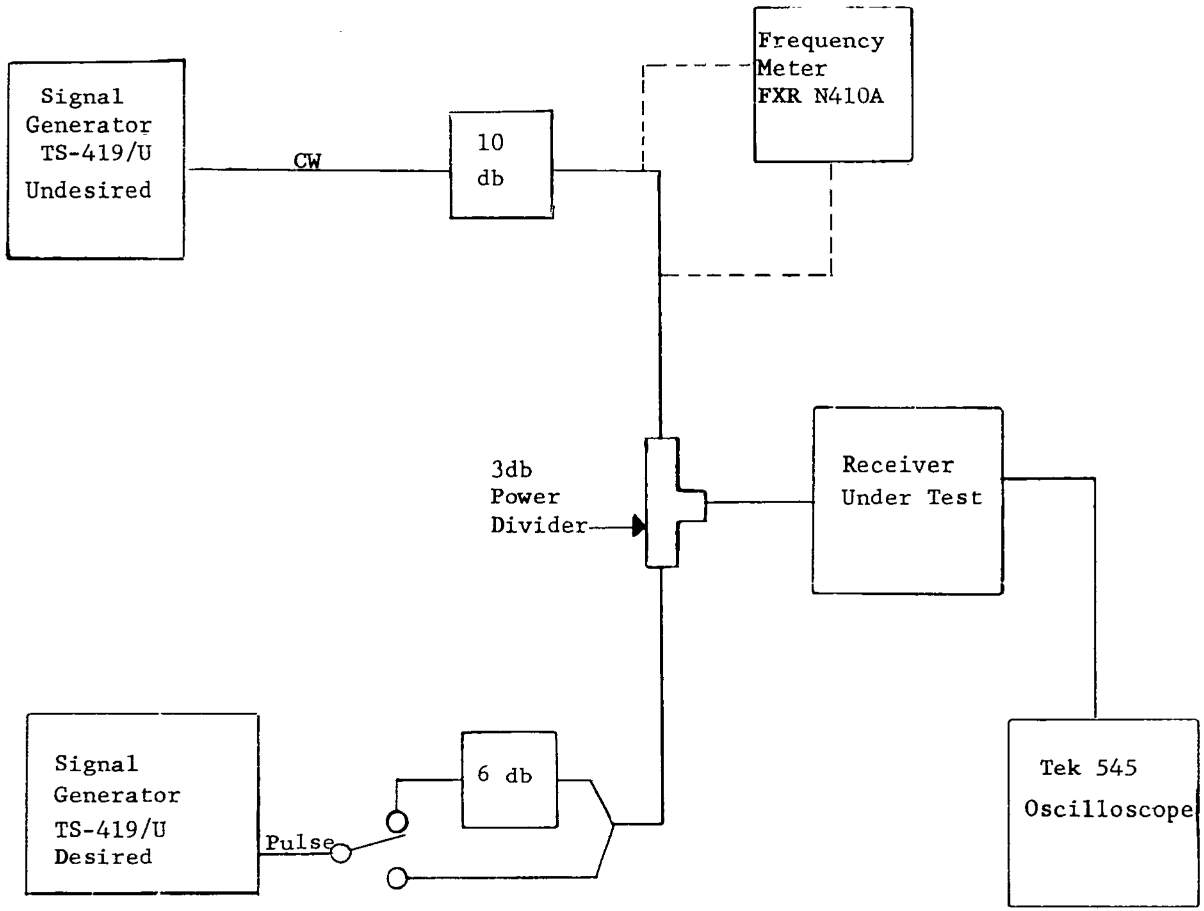


Figure 3.3.9 Adjacent Signal Interference Block Diagram

3.3.10 Pulse Desensitization

3.3.10.1 General The pulse desensitization test is indicative of the capabilities of a receiver in the presence of on-frequency pulsed interference. It measures receiver recovery characteristics following an interfering signal.

3.3.10.2 Measurement Setup The test setup is shown in figure 3.3.10. The system sync was fed to the undesired signal and to a Tektronix 545 Oscilloscope. The delayed output trigger from the oscilloscope was used to trigger the desired signal. The pulse characteristics of both signal generators were the normal modulation characteristics of the radar system.

3.3.10.3 Procedure

(a) Both signal generators and the receiver were tuned to the mean test frequency.

(b) The sync delay of the desired signal was set to 1/2 PRF in seconds.

(c) The undesired signal generator was set at maximum output and held constant throughout the test.

(d) The standard response (MVS) was then obtained with the desired signal and recorded.

(e) The delay was decreased and the standard response (MVS) measured at each increment until the desired signal delay was at minimum.

3.3.10.4 Remarks

(a) Maximum interfering power available was -13.5 dbm due to the necessary coupling network.

3.3.10.5 Data Date 29 March 1962

Band L

NORMAL RECEIVER

Receiver Tuned Frequency 1315.5 mc

Standard Response (MVS) -107 dbm

Desired Pulse Delay (usec)	Desired Signal Power (dbm)	Undesired Signal Power (dbm)
1400	-107	-13.5
1000	-107	-13.5
600	-107	-13.5
200	-107	-13.5
100	-107	-13.5
20	-107	-13.5
10	-107	-13.5
8	-107	-13.5
7	-107	-13.5
6	-106	-13.5
5	-105.5	-13.5
4	-101.5	-13.5

MTI RECEIVER Date 29 March 1962

Receiver Tuned Frequency 1315.1 mc

Standard Response (MVS) -105.5 dbm

Desired Signal Delay (usec)	Desired Signal Power (dbm)	Undesired Signal Power (dbm)
1400	-105.5	-13.5
1000	-105.5	-13.5
600	-105.5	-13.5
200	-105.5	-13.5
100	-105.5	-13.5
20	-105.5	-13.5
10	-105.5	-13.5
8	-103.5	-13.5
7	-103.5	-13.5
6	-103.0	-13.5
5	-103.0	-13.5
4	-102.5	-13.5

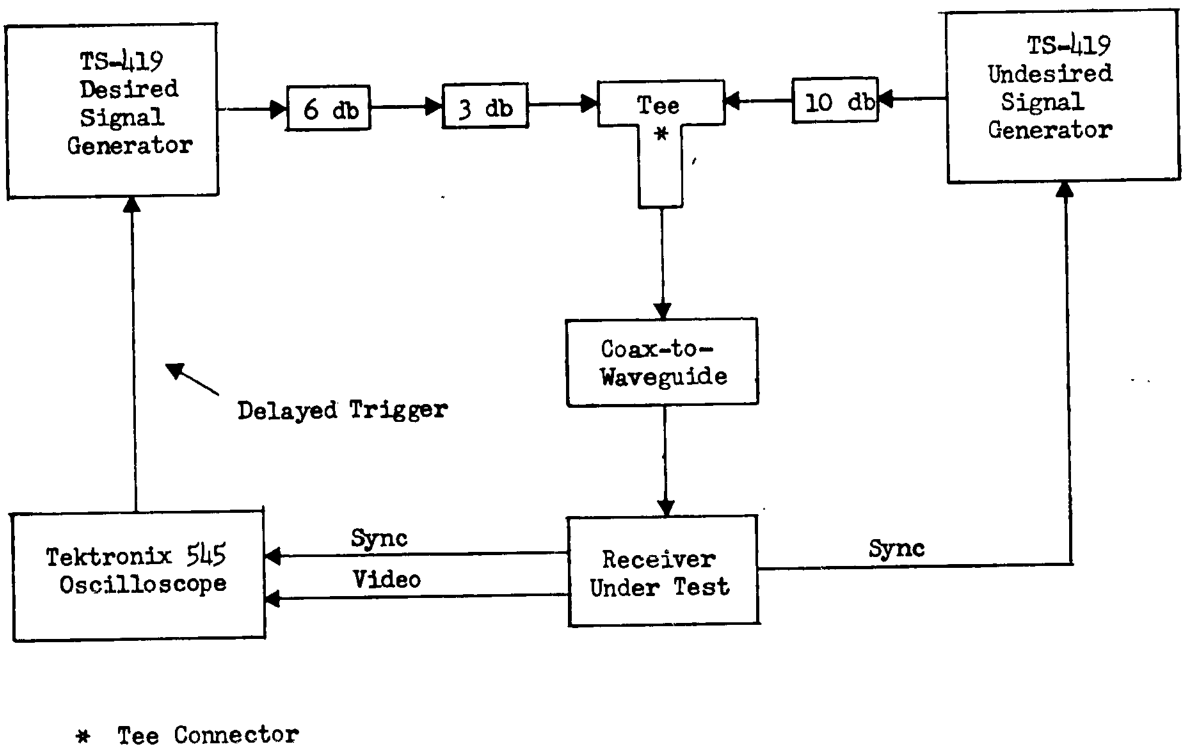


Figure 3.3.10 Pulse Desensitization Test Setup

3.3.11 CW Desensitization

3.3.11.1 General The CW desensitization test is designed to measure the sensitivity of a receiver in the presence of on-frequency CW interference signals. This test is a measure of the receiver to perform its normal function despite the change in gain caused by a CW signal.

3.3.11.2 Measurement Setup The test is shown in figure 3.3.11. The desired signal generator was set for the normal modulation characteristics and the interfering signal for CW at maximum power output.

3.3.11.3 Procedure

(a) The desired and interfering signals were tuned to the receiver's mean frequency.

(b) The interfering signal was decreased in 6 db steps from maximum power output and the standard response (MVS) was measured at each step with the desired signal generator.

3.3.11.4 Remarks

(a) The maximum power available was -13.5 dbm due to the necessary coupling network.

3.3.11.5 **Data** Date 1 March 1962

Band L

NORMAL RECEIVER

Receiver Tuned Frequency 1315.4 mc

Standard Response (MVS) -106.5 dbm

Interfering CW Signal Power (dbm)	Desired Pulse Signal Power (dbm)
-13.5	-89.5
-19.5	-90.5
-25.5	-92.5
-31.5	-94.0
-37.5	-97.5
-43.5	-101.0
-49.5	-104.0
-55.5	-105.0
-61.5	-106.5
-67.5	-106.5

MTI RECEIVER Date 29 March 1962

Receiver Tuned Frequency 1315.0 mc

Standard Response (MVS) -105.5 dbm

Interfering CW Signal Power (dbm)	Desired Pulse Signal Power (dbm)
-13.5	-93.5
↓	↓
-78.5	-93.5
-84.5	-93.5
-90.5	-93.5
-96.5	-93.5
-102.5	-99.0
-108.5	-104.5
-114.5	-105.5

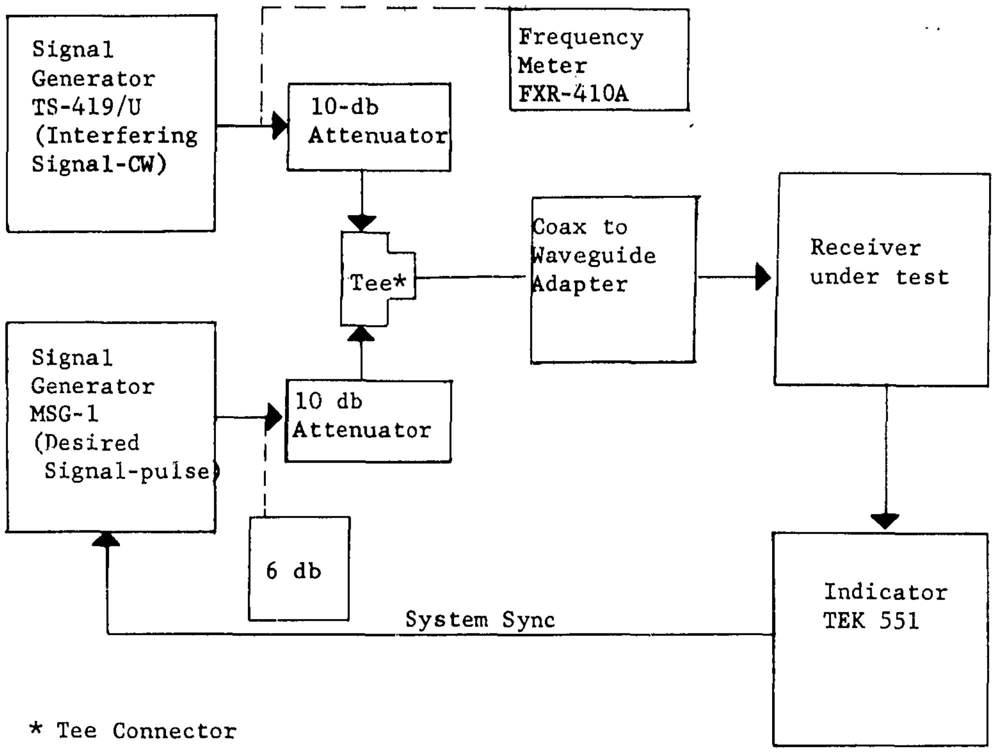


Figure 3.3.11 CW Desensitization Test Set-up

3.3.12 Dynamic Range

3.3.12.1 General The test of receiver dynamic range gives an indication of behavior of a particular receiver between the levels of minimum visible signal and limiting. It will measure the effectiveness of an AVC or AGC system if one is used and it depicts the linearity of the receiver through this range.

3.3.12.2 Measurement Setup The test connections for dynamic range measurements are shown in Figure 3.3.12. The rf output from the signal generator was fed to the coax-to-waveguide adapter and into the receiver under test. The video output response was measured on a Tektronix 545 Oscilloscope.

3.3.12.3 Procedure

(a) The receiver and rf signal generator were tuned to the receiver mean test frequency.

(b) The output of the signal generator was adjusted to give a standard response (MVS). The RF input level and the video output level were recorded.

(c) The signal generator output was increased in 6 db steps until video limiting took place. The video output level was recorded at each 6 db step.

(d) Steps a-c were repeated for the maximum and minimum usable gain settings. The test was rerun using the video output from the detector jack.

3.3.12.4 **Data** Date 18 May 1962

NORMAL RECEIVER
Table I

Receiver Tuned Frequency 1315.2 mc

Point of Test Detector Output Jack

A. Maximum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
-100.5		1.4
- 94.5		2.0
- 88.5		2.3
- 82.5		2.6
- 76.5		3.0
- 70.5		3.2
- 67.5	limit	3.3
- 64.5		3.3

B. Average Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
- 98.5		0.2
- 92.5		0.4
- 86.5		0.9
- 80.5		1.8
- 74.5	limit	2.2
- 68.5		2.2

C. Minimum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
- 98.5		0.1
- 92.5		0.3
- 86.5		0.5
- 80.5		0.8
- 74.5		1.8
- 68.5		2.6
- 62.5		3.5
- 56.5		4.0
- 53.5	limit	4.1
- 50.5		4.1

3.3.12.4 **Data** Date 9 May 1962

Table II

Receiver Tuned Frequency 1315.0 mc

Point of Test Video Output Jack

A. Maximum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
-102.0		1.8
- 96.0		2.1
- 90.0	limit	2.2
- 84.0		2.2

B. Average Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
-106.0		0.8
-100.0		1.2
- 94.0		1.6
- 88.0		1.9
- 82.0	limit	2.1
- 76.0		2.1

C. Minimum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
-100.5		0.1
- 94.5		0.3
- 88.5		0.7
- 82.5		1.5
- 76.5		1.9
- 70.5	limit	2.0
- 64.5		2.0

3.3.12.4 Data Date 22 March 1962

MTI RECEIVER

Receiver Tuned Frequency 1315.0 mc

Point of Test Video Output Jack

A. Maximum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
- 99.5		0.9
- 93.5		1.1
- 87.5		1.3
- 81.5	limit	1.4
- 75.5		1.4

B. Average Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
-101		0.5
- 95		0.6
- 89		0.8
- 83	limit	1.0
- 77		1.0

C. Minimum Usable Sensitivity

Power Input (dbm)		Peak Output (volts)
- 96		0.1
- 90		0.2
- 84		0.3
- 78		0.5
- 72		0.7
- 66		0.9
- 60	limit	1.0
- 54		1.0

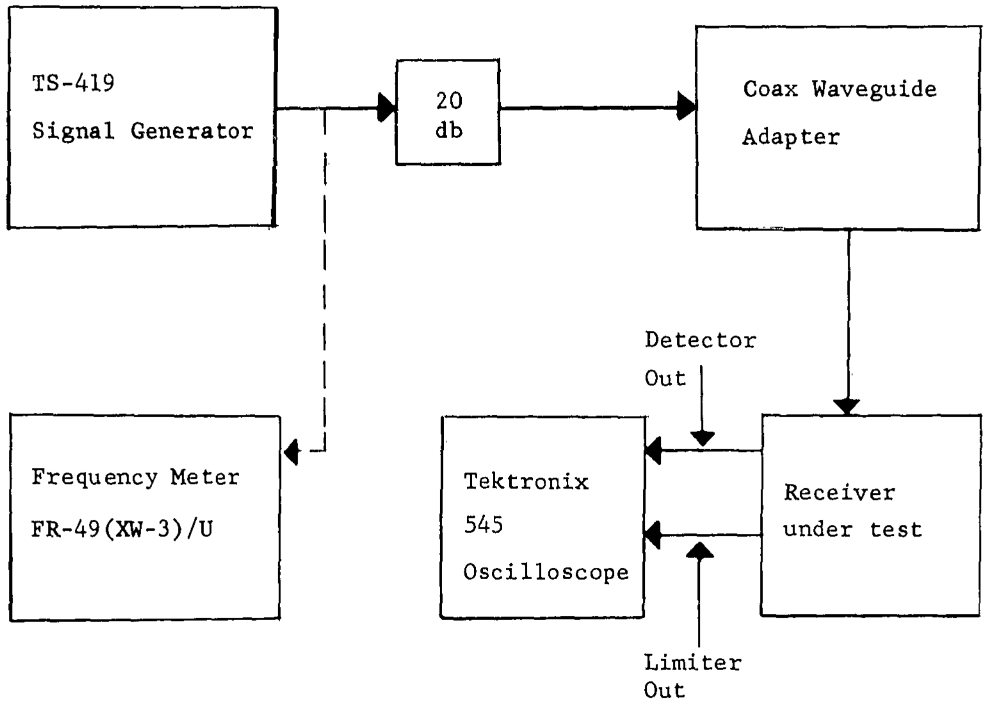


Figure 3.3.12 Dynamic Range Test Set-up

3.3.13 Oscillator Radiation Test

3.3.13.1 General This test was performed to determine the frequency and amplitude of energy generated within the receiver by the local oscillator and other frequency producing circuits. The receiver was considered a transmitter for this test.

3.3.13.2 Measurement Setup The oscillator radiation test setup is shown in Figure 3.3.13. The receiver was connected through coax-to-waveguide transition and suitable bandpass filters to a field intensity meter (FIM). A frequency meter was inserted in the line only to measure the frequency of radiated signals.

3.3.13.3 Procedure

a. The receiver was tuned to the mean test frequency (1315.0 mc) and the FIM was tuned from 150 kc to 10 kmc. All detected signals were measured for frequency and amplitude.

b. This procedure was repeated for the high and low test frequencies (1283.5 and 1346.5 mc).

c. Power levels in data include loss due to out of band characteristics of coax-to-waveguide adapter.

3.3.13.4 Remarks

The Coax-to-Waveguide Adapter calibration graph (Figure 3.3.6A) was used for correction of the power levels as in the Spurious Response Test (3.3.6).

3.3.13.5 Oscillator Radiation Data Date 5 March 1962

Table I

Band L

Receiver Frequency 1315.5 mc

Stalo Frequency 1346.4 mc

Frequency (mc)	Power Level (dbm)	Identification
1346.4	-33	L.O.
2690.0	only audible indication obtained	2nd. har. of L.O.
5383.0	-43.7	4th. har. of L.O.

Table II

Band L

Receiver Frequency 1283.4 mc

Stalo Frequency 1313.4 mc

Frequency (mc)	Power Level (dbm)	Identification
1313.4	-41.5	L.O.
3934.0	-60.5	3rd har. of L.O.
5254.0	-59.8	4th har. of L.O.

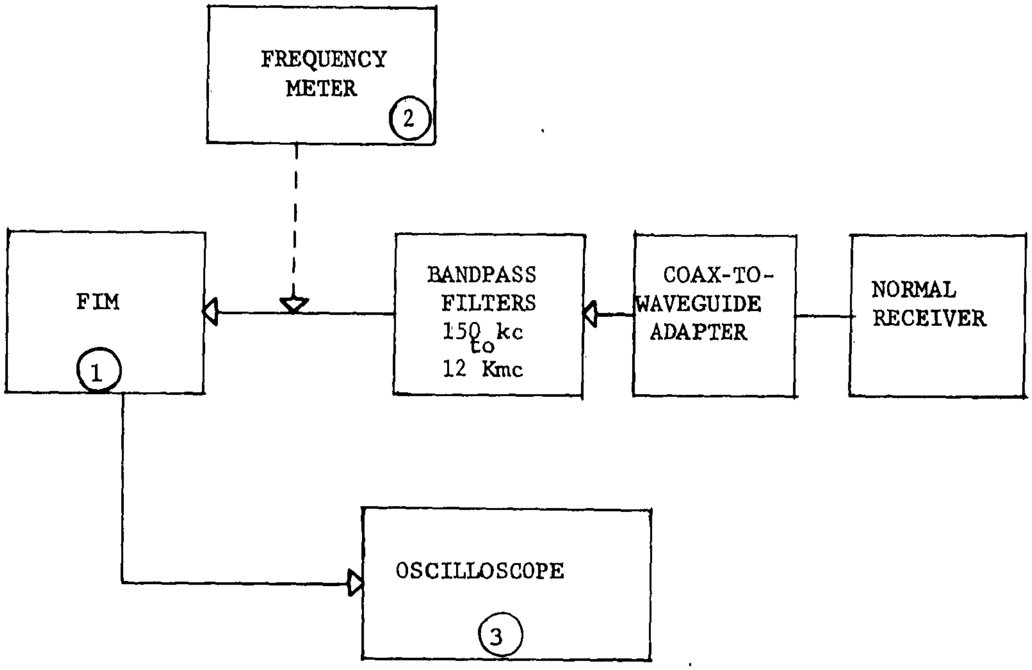
Table III

Band L

Receiver Frequency 1346.5 mc

Stalo Frequency 1316.5 mc

Frequency (mc)	Power Level (dbm)	Identification
1316.5	-39.0	L.O.
3943.0	-58.0	3rd. har. of L.O.
5267.0	-48.0	4th. har. of L.O.



Test Equipment Used

1. Polarad FIM and Associated Tuning Heads.
2. Frequency Meters-FXR-N410A and N414A.
3. Oscilloscope-Tektronix Type 551.

Figure 3.3.13-Oscillator Radiation Test Block Diagram

PART IV

Antenna Pattern Measurements

3.4 Antenna Measurements

3.4.1 General The purpose of these measurements is to obtain a representation of the spatial distribution of power radiated into space or absorbed by a system. A complete set of characteristics for a system should provide absolute field patterns for all measureable transmitter-radiated signals, and for all receiver susceptible frequencies.

3.4.1.1 Measurement Setup The test setup is shown in Figure 3.2.1. Measurements were taken from the "far-field" test site, which showed minimum antenna pattern distortion. The test site used was test site #2, shown on the topographical map, Figure 2-1.

3.4.1.2 Procedure for Rotatable Antennas

a. The transmitter was tuned to the mean test frequency.

b. The test and radar antenna were oriented for maximum response with the field intensity meter tuned to the transmitter frequency.

c. The video output of the FIM was fed to the recorder. Suitable attenuators were used between the FIM and the test antenna to keep the FIM output within the dynamic range of the recorder used.

d. The radar antenna was then rotated throughout 360° and a recording was made of at least three complete revolutions of the antenna.

e. A signal generator set at the system characteristics was used to calibrate the dynamic range of the recorder on each recording made.

f. This was repeated with the FIM tuned to the harmonic frequencies and spurious frequencies. Measurements were taken in both horizontal and vertical planes of polarization.

3.4.2. <u>Measurement Setup for Specific Receiver Frequencies</u> The test set-up is shown in Figure 3.3.7. The signal source was fed into a circularly polarized antenna at a distance of approximately 5050 feet from the AN/FPS-8 antenna.

3.4.2.1 <u>Procedure for Received Antenna Patterns</u>

a. The signal source was tuned to one of the specific frequencies. These specific frequencies were 1000, 3500, 4000 and 5650 megacycles.

b. The transmitting antenna and radar antenna were oriented for maximum received power.

c. The received power level was measured on the field intensity meter. A signal generator and frequency meter were used to determine the power level frequency of the received signal.

d. This power level and the azimuth angle was recorded.

e. The radar antenna was then rotated in 2.5 degree increments and the received power level measured and recorded at each increment.

f. The relative gain figure, above or below the nominal gain of the antenna, was determined in respect to the nominal gain of the antenna (35.5 db). This was done by comparing the received power levels at L Band frequencies, to the received power levels of the specific frequencies.

3.4.3 Remarks

a. Due to the difficulties of determining the true gain of the radar antenna, shown in paragraph 3.3.7, the antenna patterns were plotted to relative terms. To determine the gain of the radar antenna at the specific frequencies, add the relative gain figure of the data or the antenna pattern to the nominal gain of the radar antenna (35.5 db).

EXAMPLE;

Relative Gain Figure + Nominal Gain = Relative Gain

Relative Gain Figure at 0° azimuth (1000 mc)	- 9.3 db
Nominal Gain at L Band Frequencies	35.5 db
Relative Gain at 1000 mc	26.2 db

b. The zero degree indication in the data and antenna patterns are relative to site #2, shown in Figure 2-1, Topographical Data. Plus degrees are clockwise and negative degrees are counter-clockwise in respect to the radiated beam.

3.4.4

Data

Date 4 April 1962

(A) Fundamental
Fundamental Frequency 1316.1 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	114.5	- 62.5	61.0	-125	59.0
- 2.5	96.0	- 65	60.0	-127.5	59.0
- 5	77.0	- 67.5	67.0	-130	47.0
- 7.5	72.0	- 70	66.5	-132.5	62.5
-10	58.0	- 72.5	69.0	-135	61.0
-12.5	50.0	- 75	70.0	-137.5	60.5
-15	59.0	- 77.5	69.0	-140	64.0
-17.5	66.0	- 80	71.3	-142.5	67.0
-20	65.5	- 82.5	73.8	-145	66.7
-22.5	72.5	- 85	72.5	-147.5	64.0
-25	70.0	- 87.5	74.3	-150	59.0
-27.5	63.8	- 90	74.0	-152.5	61.0
-30	66.4	- 92.5	74.0	-155	68.0
-32.5	67.0	- 95	76.7	-157.5	70.0
-35	69.0	- 97.5	74.5	-160	68.0
-37.5	66.4	-100	73.0	-162.5	68.0
-40	68.0	-102.5	72.8	-165	69.0
-42.5	71.0	-105	70.0	-167.5	67.0
-45	70.2	-107.5	66.5	-170	67.0
-47.5	56.0	-110	65.0	-172.5	61.0
-50	58.5	-112.5	47.3	-175	52.6
-52.5	59.0	-115	63.5	-177.5	62.5
-55	62.0	-117.5	62.0	-180	66.4
-57.5	53.0	-120	58.5		
-60	60.0	-122.5	58.0		
0	114.5	37.5	62.0	75	63.0
2.5	97.0	40	67.8	77.5	64.5
5	78.0	42.5	70.0	80	65.5
7.5	72.0	45	70.2	82.5	70.0
10	73.0	47.5	53.8	85	68.0
12.5	72.0	50	67.0	87.5	67.0
15	66.0	52.5	69.8	90	72.0
17.5	56.0	55	62.5	92.5	70.5
20	54.0	57.5	57.5	95	68.0
22.5	52.0	60	61.0	97.5	68.2
25	63.5	62.5	54.8	100	68.5
27.5	54.0	65	61.8	102.5	66.0
30	48.0	67.5	61.7	105	65.0
32.5	60.0	70	61.5	107.5	62.8
35	62.0	72.5	67.0	110	53.0

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
112.5	61.0	137.5	58.0	162.5	70.0
115	57.3	140	65.5	165	71.0
117.5	62.0	142.5	69.0	167.5	69.0
120	49.0	145	64.0	170	67.0
122.5	56.0	147.5	51.6	172.5	65.5
125	55.0	150	58.0	175	65.4
127.5	57.0	152.5	59.5	177.5	66.4
130	62.0	155	63.0	180	66.4
132.5	59.0	157.5	68.5		
135.0	51.2	160	71.8		

(B) Date 4 April 1962

Fundamental
Fundamental Frequency 1316.1 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	91.7	- 62.5	66.5	-125	63.0
- 2.5	85.2	- 65.0	68.5	-127.5	59.0
- 5	72.0	- 67.5	65.5	-130	62.5
- 7.5	65.0	- 70.0	66.0	-132.5	51.7
-10	65.5	- 72.5	65.5	-135	56.5
-12.5	63.3	- 75	63.5	-137.5	53.5
-15	57.7	- 77.5	63.5	-140	62.1
-17.5	57.7	- 80	66.3	-142.5	59.0
-20	75.0	- 82.5	65.5	-145	56.5
-22.5	75.0	- 85	62.0	-147.5	55.3
-25	73.0	- 87.5	62.0	-150	58.0
-27.5	66.2	- 90	63.0	-152.5	57.2
-30	66.1	- 92.5	62.5	-155	58.0
-32.5	66.5	- 95	63.0	-157.5	63.5
-35	64.6	- 97.5	64.5	-160	63.7
-37.5	64.0	-100	52.5	-162.5	62.5
-40	67.5	-102.5	57.5	-165	61.5
-42.5	64.5	-105	62.5	-167.5	69.5
-45	64.5	-107.5	59.8	-170	68.2
-47.5	63.5	-110	60.0	-172.5	62.2
-50	72.5	-112.5	64.0	-175	61.0
-52.5	65.5	-115	59.5	-177.5	65.5
-55	67.5	-117.5	61.5	-180	59.3
-57.5	61.5	-120	65.5		
-60	66.5	-122.5	58.8		

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	91.7	62.5	63.0	125	54.8
2.5	85.2	65.0	65.8	127.5	52.1
5.0	59.0	67.5	68.2	130	55.3
7.5	55.3	70	64.5	132.5	60.3
10	63.0	72.5	66.0	135	52.3
12.5	68.5	75	64.8	137.5	56.2
15	69.5	77.5	65.5	140	63.5
17.5	69.5	80	66.0	142.5	61.0
20	69.5	82.5	67.5	145	56.3
22.5	69.2	85	65.0	147.5	61.5
25	71.0	87.5	67.9	150	62.2
27.5	70.5	90	70.5	152.5	61.5
30	65.1	92.5	64.3	155	66.5
32.5	66.2	95	64.5	157.5	67.5
35	62.0	97.5	66.8	160	58.2
37.5	62.0	100	65.0	162.5	68.5
40	65.3	102.5	58.0	165	70.5
42.5	66.5	105	59.8	167.5	66.5
45	72.5	107.5	60.5	170	63.2
47.5	66.5	110	52.3	172.5	64.9
50	70.7	112.5	57.7	175	61.9
52.5	69.2	115	49.5	177.5	53.5
55	68.5	117.5	62.0	180	59.3
57.5	69.3	120	56.0		
60	68.0	122.5	58.5		

(C) Spurious Frequency 1135.0 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
- 0	40.5	-40.0	3.5	- 80.0	3.5
- 2.5	29.0	-42.5		- 82.5	
- 5	15.0	-45		- 85	
- 7.5	8.0	-47.5		- 87.5	3.5
-10	6.5	-50		- 90	6.5
-12.5	3.5	-52.5		- 92.5	6.5
-15	6.5	-55	3.5	- 95	6.5
-17.5	8.8	-57.5	7.8	- 97.5	7.0
-20	3.5	-60	5.0	-100	7.0
-22.5		-62.5	3.5	-102.5	3.5
-25		-65		-105	
-27.5		-67.5		-107.5	
-30		-70		-110	
-32.5		-72.5		-112.5	
-35		-75		-115	
-37.5	3.5	-77.5	3.5	-117.5	3.5

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
-120.0	3.5	-132.5	3.5	145.	3.5
-122.5	3.5	-135	3.5		
-125	3.5	-137.5	3.5		
-127.5	3.5	-140	3.5		
-130	3.5	-142.5	3.5	180	3.5

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	40.5	45	3.5	90	3.5
2.5	29,0	47.5		92.5	3.5
5	15.3	50		95	3.5
7.5	3.5	52.5		97.5	5.0
10	7.5	55.0		100	3.5
12.5	6.5	57.5		102.5	
15	3.5	60.0		105	
17.5	3.5	62.5		107.5	
20.0	7.5	65		110	
22.5	15.2	67.5		112.5	
25	12.3	70		115	
27.5	3.5	72.5		117.5	3.5
30		75.0		120	4.5
32.5		77.5		122.5	3.5
35		80.0		125	3.5
37.5		82.5			
40		85			
42.5	3.5	87.5	3.5	180	3.5

(D)

Spurious Frequency 1135.0 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	11.5
- 2.5	5.0
- 5	3.5
- 7.5	3.5
-10	
-12.5	
-180	3.5

Azimuth (degrees)	Rel. Level (db)
0	11.5
2.5	9
5.0	4.0
7.5	3.5
↓	↓
180	3.5

(E)

Spurious Frequency 1499.3 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	47.8	- 65	4.5	-130	4.5
- 2.5	38.5	- 67.5	4.5	-132.5	4.5
- 5	13.7	- 70	4.5	-135	10.5
- 7.5	4.5	- 72.5	4.5	-137.5	4.5
-10	6.5	- 75	4.5	-140	12.7
-12.5	9.5	- 77.5	4.5	-142.5	11.5
-15	4.5	- 80	11.5	-145	6.0
-17.5	13.0	- 82.5	8.5	-147.5	6.0
-20	6.5	- 85	10.5	-150	8.5
-22.5	4.5	- 87.5	13.0	-152.5	9.5
-25	6.5	- 90	13.7	-155	6.5
-27.5	5.5	- 92.5	8.5	-157.5	9.5
-30	13.0	- 95	11.5	-160	10.5
-32.5	4.5	- 97.5	4.5	-162.5	7.5
-35	10.5	-100	9.5	-165	8.5
-37.5	4.5	-102.5	10.0	-167.5	8.5
-40	12.5	-105	6.5	-170	4.5
-42.5	6.5	-107.5	4.5	-172.5	10.5
-45	4.5	-110	6.5	-175	8.5
-47.5	4.5	-112.5	4.5	-177.5	13.0
-50	7.5	-115	6.5	-180	13.7
-52.5	10.5	-117.5	4.5		
-55	4.5	-120	4.5		
-57.5	4.5	-122.5	4.5		
-60	4.5	-125	4.5		
-62.5	4.5	-127.5	4.5		

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	47.8	62.5	8.5	125	4.5
2.5	38.0	65	8.5	127.5	4.5
5.0	18.5	67.5	6.5	130	4.5
7.5	4.5	70	10.5	132.5	4.5
10	14.5	72.5	10.5	135	4.5
12.5	9.5	75	9.5	137.5	4.5
15	14.5	77.5	8.5	140	4.5
17.5	17.5	80	10.5	142.5	4.5
20	19.3	82.5	12.0	145	8.5
22.5	16.5	85	11.5	147.5	4.5
25	6.5	87.5	11.5	150	4.5
27.5	4.5	90	14.0	152.5	4.5
30	12.5	92.5	13.0	155	5.5
32.5	12.5	95	11.0	157.5	9.5
35	4.5	97.5	12.5	160	4.5
37.5	4.5	100	4.5	162.5	4.5
40	4.5	102.5	11.0	165	4.5
42.5	10.5	105	12.0	167.5	6.5
45	4.5	107.5	8.5	170	11.0
47.5	10.5	110	11.5	172.5	4.5
50	10.5	112.5	4.5	175	4.5
52.5	4.5	115	4.5	177.5	13.0
55	7.5	117.5	12.0	180	13.7
57.5	4.5	120	4.5		
60	4.5	122.5	4.5		

(F)

Spurious Frequency <u>1499.3 mc</u>
Average Transmitter Power <u>950 watts</u>
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	17.5	-37.5	4.5	-102.5	4.5
- 2.5	12.7	-40	7.5		
- 5.0	8.5	-42.5	4.5		
- 7.5	8.0		4.5	-125	4.5
-10	6.5			-127.5	5.5
-12.5	4.5			-130	4.5
-15	4.5				
-17.5	4.5	-82.5	4.5		
-20	4.5	-85	6.0	-162.5	4.5
-22.5	4.5	-87.5	4.5	-165.	5.5
-25	4.5	-90	4.5	-167.5	4.5
-27.5	4.5	-92.5	4.5	-170	4.5
-30	4.5	-95	7.5	-172.5	4.5
-32.5	4.5	-97.5	4.5	-175	7.5
-35	4.5	-100	4.5	-177.5	7.5
				-180	4.5

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	17.5	35.0	6.5	100	4.5
2.5	13.7	37.5	6.5	102.5	4.5
5.0	6.5	40.0	4.5		
7.5	4.5	42.5	4.5		
10	4.5	45	4.5		
12.5	4.5				
15	4.5				
17.5	4.5			157.5	4.5
20	7.5			160	6.5
22.5	8.0			162.5	4.5
25	4.5				
27.5	4.5				
30	4.5				
32.5	4.5	97.5	4.5	180	4.5

(G)

Spurious Frequency 1662.5 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	19.1	-12.5	5.1	-25	5.1
- 2.5	15.5	-15	5.1		
- 5.0	6.1	-17.5	5.1		
- 7.5	5.1	-20	5.1		
-10	5.1	-22.5	5.1	-180	5.1

Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)	Azimuth (degrees)	Rel. Level (db)
0	19.1	22.5	5.1	45	5.1
2.5	12.1	25	5.1		
5.0	7.1	27.5	5.1		
7.5	5.1	30	5.1		
10	5.1	32.5	5.1		
12.5	5.1	35	5.1		
15	5.1	37.5	5.1		
17.5	5.1	40	5.1	180	5.1
20	7.6	42.5	5.1		

(H) Spurious Frequency 1662.5 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site # 2

Azimuth (degrees)	Rel. Level (db)
0	9.5
- 2.5	13.1
- 5	5.1
- 7.5	5.1
↓	↓
-180	5.1

Azimuth (degrees)	Rel. Level (db)
0	9.5
2.5	9.5
5	5.1
7.5	5.1
↓	↓
180	5.1

(I) Spurious Frequency 2099.5 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	17.5
- 2.5	8.5
- 5	5.0
- 7.5	5.0
↓	↓
-180	5.0

Azimuth (degrees)	Rel. Level (db)
0	17.5
2.5	11.2
5	5.0
7.5	5.0
180	5.0

(J) Spurious Frequency 2099.3 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	13.7
- 2.5	7.0
- 5	5.0
- 7.5	5.0
-180	5.0

Azimuth (degrees)	Rel. Level (db)
0	13.7
2.5	5.0
5	5.0
7.5	5.0
180	5.0

(K) Spurious Frequency 1751.5 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	17.6
- 2.5	13.5
- 5	5.6
- 7.5	5.6
-10	5.6
↓	↓
-180	5.6

Azimuth (degrees)	Rel. Level (db)
0	17
2.5	10
5	5.6
7.5	5.6
10	5.6
↓	↓
180	5.6

(L) Spurious Frequency 1751.5 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	6.6
- 2.5	5.6
- 5	5.6
- 7.5	5.6
-10	5.6
↓	↓
-180	5.6

Azimuth (degrees)	Rel. Level (db)
0	6.6
2.5	6.0
5	5.6
7.5	
10	
180	5.6

(M) Spurious Frequency 1823.8 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
- 0	16.3
- 2.5	15.5
- 5	5.5
- 7.5	4.5
-10	4.5
-180	4.5

Azimuth (degrees)	Rel. Level (db)
0	16.3
2.5	15.0
5	8.0
7.5	5.5
10	4.5
180	4.5

(N) Spurious Frequency 1823.8 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	7.5
- 2.5	9.7
- 5	4.5
- 7.5	4.5
-10	4.5
↓	↓
-180	4.5

Azimuth (degrees)	Rel. Level (db)
0	7.5
2.5	7.5
5	4.5
7.5	4.5
10	4.5
↓	↓
180	4.5

(O) Spurious Frequency 1968.8 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	13.0
- 2	8.4
- 5	6.4
- 7.5	6.4
-10	6.4
↓	↓
-180	6.4

Azimuth (degrees)	Rel. Level (db)
0	13.0
2.5	8.0
5	6.4
7.5	6.4
10	6.4
↓	↓
180	6.4

(P) Spurious Frequency 2493.5 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	14.5
- 2.5	10.2
- 5	5.2
- 7.5	5.2
-10	5.2
↓	↓
-180	5.2

Azimuth (degrees)	Rel. Level (db)
0	14.5
2.5	5.2
5	5.2
7.5	5.2
10	5.2
↓	↓
180	5.2

(Q) Spurious Frequency 2214.1 mc
Average Transmitter Power 950 watts
Horizontal Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	13.7
- 2.5	9.5
- 5	4.5
- 7.5	4.5
-10	4.5
↓	↓
-180	4.5

Azimuth (degrees)	Rel Level (db)
0	13.7
2.5	8.5
5	4.5
7.5	4.5
10	4.5
↓	↓
180	4.5

(R) Spurious Frequency 2214.1 mc
Average Transmitter Power 950 watts
Vertical Polarization
Site #2

Azimuth (degrees)	Rel. Level (db)
0	11
- 2.5	4.8
- 5	4.8
- 7.5	4.8
-10	4.8
↓	↓
-180	4.8

Azimuth (degrees)	Rel. Level (db)
0	11
2.5	4.8
5.0	4.8
7.5	4.8
10	4.8
↓	↓
180	4.8

Date 18 April 1962

(S) Spurious Frequency 2634.9 mc
Average Transmitter Power 950 watts
Horizontal Polarization
2nd Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	52.5
- 2.5	34.8
- 5	16.8
- 7.5	13.0
-10	4.8
-12.5	6.0
-15	4.8
-17.5	12.8
-20	8.0
-22.5	6.8
-25	4.8
-27.5	4.8
-30	4.8
-32.5	4.8
-35	5.5
-37.5	4.8
↓	↓
-47.5	4.8
-50	7.0
-52.5	9.0
-55.0	4.8
-57.5	4.8
↓	↓
-172.5	4.8
-175	6.0
-177.5	8.3
-180	8.3

Azimuth (degrees)	Rel. Level (db)
0	52.5
2.5	34.0
5	13.5
7.5	5.8
10	4.8
12.5	7.8
15	4.8
17.5	4.8
20	7.0
22.5	4.8
25	4.8
27.5	4.8
30	4.8
32.5	4.8
35	4.8
37.5	5.8
40	4.8
↓	↓
147.5	4.8
150	6.8
152.5	4.8
↓	↓
175	4.8
177.5	8.3
180	8.3

(T) Spurious Frequency 2634.9 mc
Average Transmitter Power 950 watts
Vertical Polarization
2nd Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	16.6
- 2.5	4.8
- 5	4.8
- 7.5	4.8
-10	4.8
↓	↓
-180	4.8

Azimuth (degrees)	Rel. Level (db)
0	16.6
2.5	4.8
5	4.8
7.5	4.8
10	4.8
↓	↓
180	4.8

(U) Spurious Frequency 6670.0 mc
Average Transmitted Power 950 watts
Horizontal Polarization
Fifth Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	17.6
- 2.5	15.6
- 5	1.6
- 7.5	1.6
-10	1.6
↓	↓
-180	1.6

Azimuth (degrees)	Rel. Level (db)
0	17.6
2.5	19.1
5	1.6
7.5	1.6
10	1.6
↓	↓
170	1.6
172.5	2.6
175	1.6
177.5	1.6
180	1.6

(V) Spurious Frequency 6670.0 mc
Average Transmitted Power 950 watts
Vertical Polarization
Fifth Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	20.6
- 2.5	13.6
- 5	1.6
- 7.5	1.6
-10	1.6
↓	↓
-172.5	1.6
-175	3.6
-177.5	1.6
-180	1.6

Azimuth (degrees)	Rel. Level (db)
0	20.6
2.5	10.2
5	1.6
7.5	1.6
10	1.6
↓	↓
180	1.6

(W) Spurious Frequency 5284.4 mc
Average Transmitted Power 950 watts
Horizontal Polarization
Fourth Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	30.3
- 2.5	24.3
- 5	9.5
- 7.5	5.5
-10	6.5
-12.5	4.3
-15	2.5
-17.5	1.0
-20	2.3

Azimuth (degrees)	Rel. Level (db)
- 22.5	2.8
- 25	0.3
- 27.5	0.3
↓	↓
- 40	0.3
- 42.5	1.5
- 45	0.3
↓	↓
- 60	0.3
- 62.5	1.3
- 65	0.3
↓	↓
- 92.5	0.3
- 95	1.0
- 97.5	0.3
-100	1.5
-102.5	0.3
↓	↓
-115	0.3
-117.5	3.3
-120	0.3
-122.5	0.3
-125	3.0
-127.5	0.3
↓	↓
-145	0.3
-147.5	5.8
-150	1.0
-152.5	1.3
-155	2.5
-157.5	0.3
-160	1.3
-162.5	2.3
-165	5.8
-167.5	10.3
-170	2.5
-172.5	7.5
-175	2.5
-177.5	5.0
-180	2.3

Azimuth (degrees)	Rel. Level (db)
0	30.3
2.5	24.3
5	11.3
7.5	5.8
10	8.5
12.5	4.8
15	3.3
17.5	0.3
20	0.3
22.5	2.3
25	3.0
27.5	3.0
30	0.3
32.5	1.3
35	0.3
37.5	2.3
40	0.3
↓	↓
90	0.3
92.5	1.3
95	0.3
97.5	4.3
100	2.5
102.5	0.3
↓	↓
120	0.3
122.5	1.3
125	4.5
127.5	0.3
130	2.3
132.5	3.0
135	0.3
137.5	0.3
140	0.3
142.5	5.3
145	0.3
147.5	0.3
150	4.5
152.5	3.5
155	1.0
157.5	0.3
160	2.5
162.5	0.3
165	3.0
167.5	3.3
170	1.0
172.5	0.3
175	3.0
177.5	4.5
180	2.3

(X) Spurious Frequency 5264.4 mc
Average Transmitted Power 950 watts
Vertical Polarization
Fourth Harmonic
Site #2

Azimuth (degrees)	Rel. Level (db)
0	41.3
- 2.5	25.3
- 5	0.3
- 7.5	7.3
-10	12.5
-12.5	7.5
-15	8.3
-17.5	6.8
-20	5.3
-22.5	2.5
-25	3.5
-27.5	0.3
↓	↓
-140	0.3
-142.5	0.3
-145	5.0
-147.5	0.3
-150	0.3
-152.5	0.3
-155	5.5
-157.5	0.3
-160	0.3
-162.5	5.0
-165	5.5
-167.5	4.5
-170	7.8
-172.5	0.3
-175	0.3
-177.5	5.0
-180	0.3

Azimuth (degrees)	Rel. Level (db)
0	41.3
2.5	27.8
5	6.3
7.5	5.5
10	7.8
12.5	3.3
15	0.3
17.5	5.5
20	2.5
22.5	3.3
25	1.0
27.5	0.3
↓	↓
140	0.3
142.5	3.3
145	1.5
147.5	0.3
150	2.3
152.5	0.3
155	2.5
157.5	2.0
160	1.0
162.5	3.5
165	4.5
167.5	2.5
170	3.3
172.5	1.0
175	3.5
177.5	0.3
180	0.3

Specific Antenna Patterns

Date 16 May 1962

A. Specific Antenna Pattern
Far Field Transmitter Frequency 1000 mc

Antenna Reference Gain 35.5 db at L Band Frequencies

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	- 9.3	62.5	-35.3	125	-43.3
2.5	-12.3	65	-41.3	127.5	-48.8
5	-28.3	67.5	-42.3	130	-54.3
7.5	-30.3	70	-38.8	132.5	-46.3
10	-40.3	72.5	-38.3	135	-44.3
12.5	-36.3	75	-38.8	137.5	-42.3
15	-49.3	77.5	-54.3	140	-51.3
17.5	-48.3	80	-43.8	142.5	-46.8
20	-45.8	82.5	-40.3	145	-51.8
22.5	-46.8	85	-34.8	147.5	-43.3
25	-41.8	87.5	-34.3	150	-40.8
27.5	-41.3	90	-38.3	152.5	-39.3
30	-47.3	92.5	-39.3	155	-40.3
32.5	-45.8	95	-36.3	157.5	-39.3
35	-41.3	97.5	-37.3	160	-38.8
37.5	-44.8	100	-35.8	162.5	-41.8
40	-53.8	102.5	-43.8	165	-49.8
42.5	-43.3	105	-41.8	167.5	-42.8
45	-37.8	107.5	-47.3	170	-44.3
47.5	-37.3	110	-48.8	172.5	-44.3
50	-36.3	112.5	-41.3	175	-38.8
52.5	-38.3	115	-43.8	177.5	-44.3
55	-41.3	117.5	-44.3	180	-39.8
57.5	-51.3	120	-57.3		
60	-40.3	122.5	-47.8		

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	- 9.3	-35	-44.8	-70	-35.8
- 2.5	-12.3	-37.5	-37.8	-72.5	-38.8
- 5	-36.3	-40	-38.8	-75	-40.8
- 7.5	-37.8	-42.5	-40.8	-77.5	-41.3
-10	-50.3	-45	-37.3	-80	-36.8
-12.5	-54.3	-47.5	-40.3	-82.5	-34.3
-15	-42.3	-50	-46.8	-85	-35.3
-17.5	-41.8	-52.5	-40.8	-87.5	-40.3
-20	-42.8	-55	-38.8	-90	-39.8
-22.5	-40.3	-57.5	-38.3	-92.5	-36.3
-25	-47.8	-60	-39.8	-95	-33.8
-27.5	-39.8	-62.5	-45.8	-97.5	-42.3
-30	-39.8	-65	-38.3	-100	-41.3
-32.5	-50.3	-67.5	-33.3	-102.5	-36.8

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
-105	-35.3	-132.5	-38.3	-160	-46.3
-107.5	-36.3	-135	-40.3	-162.5	-50.3
-110	-39.8	-137.5	-45.3	-165	-53.8
-112.5	-42.3	-140	-51.3	-167.5	-49.3
-115	-38.8	-142.5	-52.3	-170	-39.8
-117.5	-44.8	-145	-37.3	-172.5	-45.8
-120	-56.8	-147.5	-36.3	-175	-38.3
-122.5	-49.3	-150	-36.3	-177.5	-41.3
-125	-43.3	-152.5	-40.3	-180	-39.8
-127.5	-43.3	-155	-43.3		
-130	-41.3	-157.5	-46.3		

B. Specific Antenna Pattern Date 16 May 1962
Far Field Transmitter Frequency 3500 mc
Antenna Reference Gain 35.5 db at L Band Frequencies

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	- 6.5	62.5	-45.0	125	-46.5
2.5	-25.0	65	-44.0	127.5	-41.0
5	-24.5	67.5	-39.0	130	-40.5
7.5	-33.5	70	-44.5	132.5	-41.0
10	-32.5	72.5	-45.5	135	-41.5
12.5	-33.5	75	-47.5	137.5	-36.0
15	-41.0	77.5	-41.0	140	-38.5
17.5	-44.0	80	-40.0	142.5	-37.5
20	-45.5	82.5	-41.5	145	-34.5
22.5	-40.0	85	-42.5	147.5	-34.0
25	-40.5	87.5	-37.5	150	-36.0
27.5	-45.0	90	-38.0	152.5	-42.0
30	-43.0	92.5	-38.0	155	-35.5
32.5	-44.0	95	-40.0	157.5	-34.5
35	-37.0	97.5	-37.5	160	-32.0
37.5	-36.5	100	-43.0	162.5	-31.0
40	-42.0	102.5	-37.0	165	-30.0
42.5	-39.5	105	-43.5	167.5	-31.5
45	-45.5	107.5	-44.0	170	-30.0
47.5	-39.0	110	-49.0	172.5	-29.5
50	-37.5	112.5	-33.5	175	-29.5
52.5	-38.0	115	-39.5	177.5	-33.0
55	-42.0	117.5	-42.0	180	-30.5
57.5	-43.0	120	-37.5		
60	-47.0	122.5	-39.0		

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	-6.5	-62.5	-34.5	-125	-39.5
- 2.5	-10.0	-65	-39.0	-127.5	-36.0
- 5	-12.0	-67.5	-33.0	-130	-35.5
- 7.5	-35.0	-70	-37.5	-132.5	-33.0
-10	-36.0	-72.5	-37.0	-135	-35.5
-12.5	-36.0	-75	-34.5	-137.5	-35.5
-15	-36.0	-77.5	-38.0	-140	-38.0
-17.5	-31.0	-80	-38.5	-142.5	-24.5
-20	-32.5	-82.5	-34.0	-145	-28.5
-22.5	-30.5	-85	-32.5	-147.5	-31.0
-25	-28.5	-87.5	-34.5	-150	-30.0
-27.5	-35.0	-90	-34.0	-152.5	-32.5
-30	-36.5	-92.5	-35.0	-155	-32.0
-32.5	-39.0	-95	-36.0	-157.5	-27.5
-35	-37.5	-97.5	-35.0	-160	-30.0
-37.5	-37.0	-100	-35.5	-162.5	-31.5
-40	-38.5	-102.5	-39.0	-165	-35.5
-42.5	-35.5	-105	-41.5	-167.5	-29.0
-45	-38.0	-107.5	-39.0	-170	-34.0
-47.5	-43.0	-110	-37.0	-172.5	-33.0
-50	-41.0	-112.5	-40.0	-175	-35.0
-52.5	-38.0	-115	-35.5	-177.5	-33.0
-55	-36.5	-117.5	-37.5	-180	-30.5
-57.5	-43.5	-120	-35.5		
-60	-43.0	-122.5	-36.0		

C. Specific Antenna Pattern — Date 16 May 1962
Far Field Transmitter Frequency 4000 mc
Antenna Reference Gain 35.5 db at L Band Frequencies

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	+ 6.0	42.5	-29.0	85	-31.0
2.5	0.0	45	-30.5	87.5	-32.5
5	-25.5	47.5	-31.5	90	-31.5
7.5	-27.0	50	-32.0	92.5	-36.5
10	-23.0	52.5	-37.0	95	-34.5
12.5	-21.5	55	-27.0	97.5	-35.5
15	-30.0	57.5	-31.0	100	-37.0
17.5	-32.5	60	-28.0	102.5	-38.5
20	-35.0	62.5	-33.0	105	-32.0
22.5	-33.0	65	-33.5	107.5	-35.0
25	-32.5	67.5	-33.0	110	-38.0
27.5	-32.5	70	-35.0	112.5	-36.0
30	-35.0	72.5	-37.0	115	-34.5
32.5	-33.0	75	-35.0	117.5	-31.5
35	-31.5	77.5	-36.0	120	-31.0
37.5	-30.5	80	-32.5	122.5	-32.0
40	-26.5	82.5	-30.0	125	-36.0

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
127.5	-32.0	145	-31.0	162.5	-30.0
130	-33.0	147.5	-33.0	165	-34.0
132.5	-30.5	150	-27.5	167.5	-30.0
135	-32.0	152.5	-24.0	170	-34.0
137.5	-34.0	155	-29.0	172.5	-29.0
140	-33.5	157.5	-31.0	175	-26.0
142.5	-28.0	160	-28.5	177.5	-32.0
				180	-27.0

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	+ 6.0	-62.5	-35.5	-125	-34.5
- 2.5	- 8.5	-65	-40.0	-127.5	-33.5
- 5	-21.5	-67.5	-34.0	-130	-29.0
- 7.5	-24.0	-70	-34.0	-132.5	-31.0
-10	-24.5	-72.5	-33.0	-135	-29.0
-12.5	-21.5	-75	-29.5	-137.5	-32.0
-15	-28.0	-77.5	-32.5	-140	-34.5
-17.5	-28.5	-80	-32.0	-142.5	-31.0
-20	-24.0	-82.5	-36.5	-145	-35.0
-22.5	-26.5	-85	-33.5	-147.5	-28.5
-25	-29.5	-87.5	-32.0	-150	-29.0
-27.5	-31.5	-90	-36.0	-152.5	-28.0
-30	-32.5	-92.5	-32.0	-155	-28.0
-32.5	-27.5	-95	-32.0	-157.5	-30.0
-35	-29.5	-97.5	-34.0	-160	-25.0
-37.5	-28.0	-100	-41.0	-162.5	-30.0
-40	-32.5	-102.5	-35.0	-165	-29.0
-42.5	-32.0	-105	-35.0	-167.5	-27.0
-45	-33.0	-107.5	-33.0	-170	-27.5
-47.5	-35.0	-110	-34.5	-172.5	-26.5
-50	-29.0	-112.5	-30.0	-175	-24.5
-52.5	-32.0	-115	-33.0	-177.5	-29.0
-55	-38.0	-117.5	-34.0	-180	-27.0
-57.5	-31.0	-120	-31.5		
-60	-32.0	-122.5	-31.5		

D. Specific Antenna Pattern — Date 16 May 1962

Far Field Transmitter Frequency 5650 mc

Antenna Reference Gain 35.5 db at L Band Frequencies

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	+ 9.0	62.5	-25	125	-24
2.5	+ 2.5	65	-23.5	127.5	-20.5
5	-17	67.5	-32.5	130	-26.5
7.5	-14	70	-33.5	132.5	-23.5
10	-13	72.5	-32.5	135	-23.5
12.5	-25	75	-30.5	137.5	-24.5
15	-26	77.5	-30.5	140	-23.5
17.5	-17	80	-28	142.5	-23
20	-25.5	82.5	-29.5	145	-22
22.5	-19.5	85	-32	147.5	-20.5
25	-25	87.5	-30.5	150	-20
27.5	-21.5	90	-28	152.5	-23.5
30	-26.5	92.5	-28.5	155	-20
32.5	-22.5	95	-23.5	157.5	-23
35	-31.5	97.5	-22	160	-23.5
37.5	-25.5	100	-25.5	162.5	-21.5
40	-27	102.5	-26	165	-20
42.5	-23.5	105	-25	167.5	-22
45	-27.5	107.5	-29	170	-28.5
47.5	-26.5	110	-25.5	172.5	-22.5
50	-28.5	112.5	-28.5	175	-26.5
52.5	-30.5	115	-20.5	177.5	-22
55	-28	117.5	-21.5	180	-22.5
57.5	-28.5	120	-24.5		
60	-26.5	122.5	-25		

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
0	+ 9.0	-37.5	-24	-75	-24.5
- 2.5	-11.5	-40	-27	-77.5	-25.5
- 5	-20.5	-42.5	-24.5	-80	-25
- 7.5	-24.0	-45	-28.5	-82.5	-24.5
-10	-22.0	-47.5	-24	-85	-22
-12.5	-21.5	-50	-23.5	-87.5	-23.5
-15	-21.5	-52.5	-31.5	-90	-22.5
-17.5	-22.5	-55	-29.5	-92.5	-23.5
-20	-24.0	-57.5	-24.5	-95	-24.5
-22.5	-27.5	-60	-25	-97.5	-22
-25	-24.5	-62.5	-22	-100	-30.5
-27.5	-27.5	-65	-28.5	-102.5	-26.5
-30	-24.5	-67.5	-25.5	-105	-29
-32.5	-30.5	-70	-18	-107.5	-25.5
-35	-28.5	-72.5	-27	-110	-25

Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)	Azimuth (degrees)	Rel. Gain Figure (db)
-112.5	-26.5	-137.5	-24.5	-162.5	-18.5
-115	-26.5	-140	-22	-165	-24.5
-117.5	-30.5	-142.5	-23.5	-167.5	-24
-120	-22.5	-145	-19.5	-170	-20.5
-122.5	-24	-147.5	-19.5	-172.5	-22.5
-125	-22	-150	-20.5	-175	-19
-127.5	-22.5	-152.5	-22.5	-177.5	-20.5
-130	-23.5	-155	-16	-180	-22.5
-132.5	-22.5	-157.5	-21.5		
-135	-27.5	-160	-23		

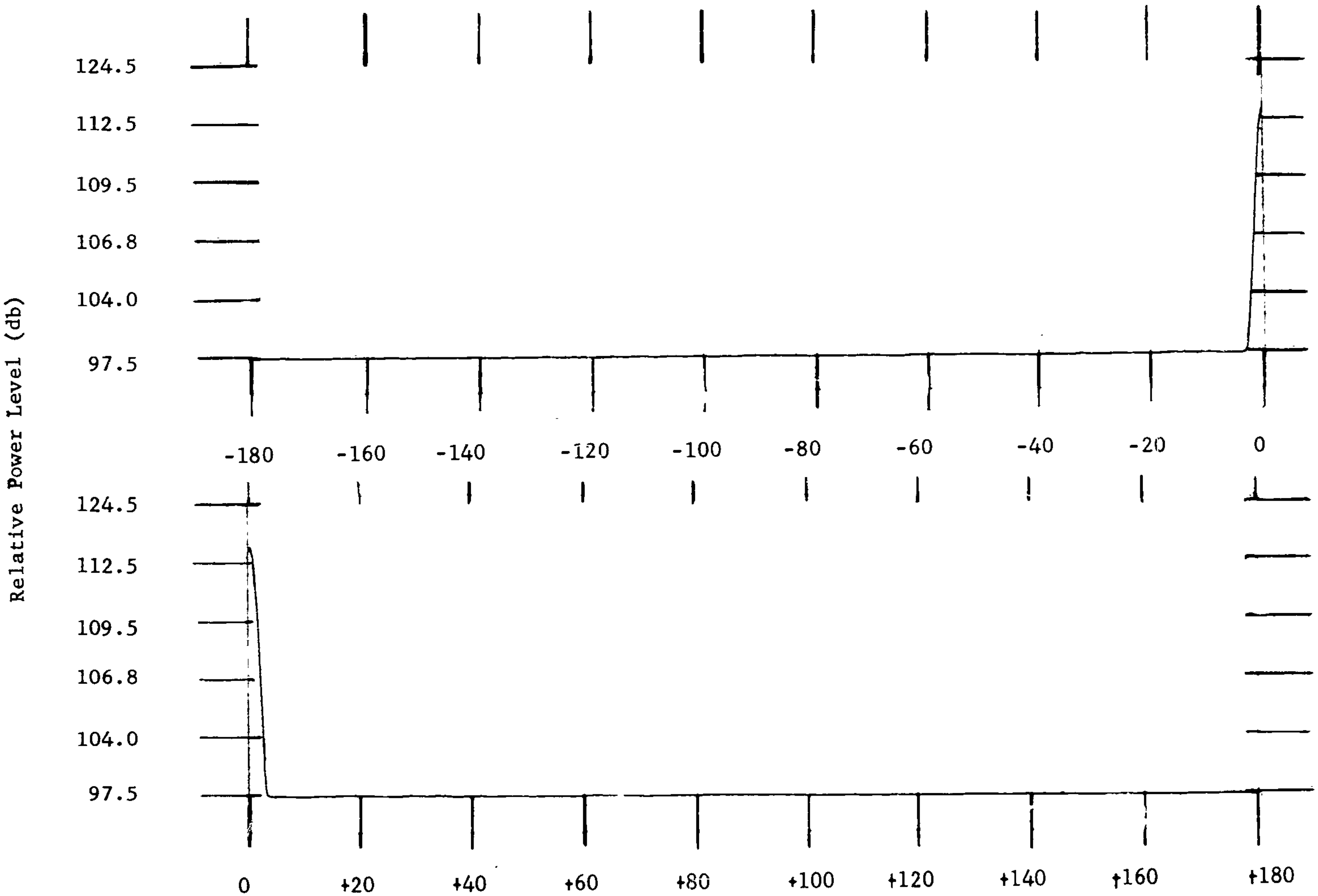


Figure 3.4.1.A Antenna Pattern - Horizontal Polarization
Fundamental Frequency - 1316.1 mc

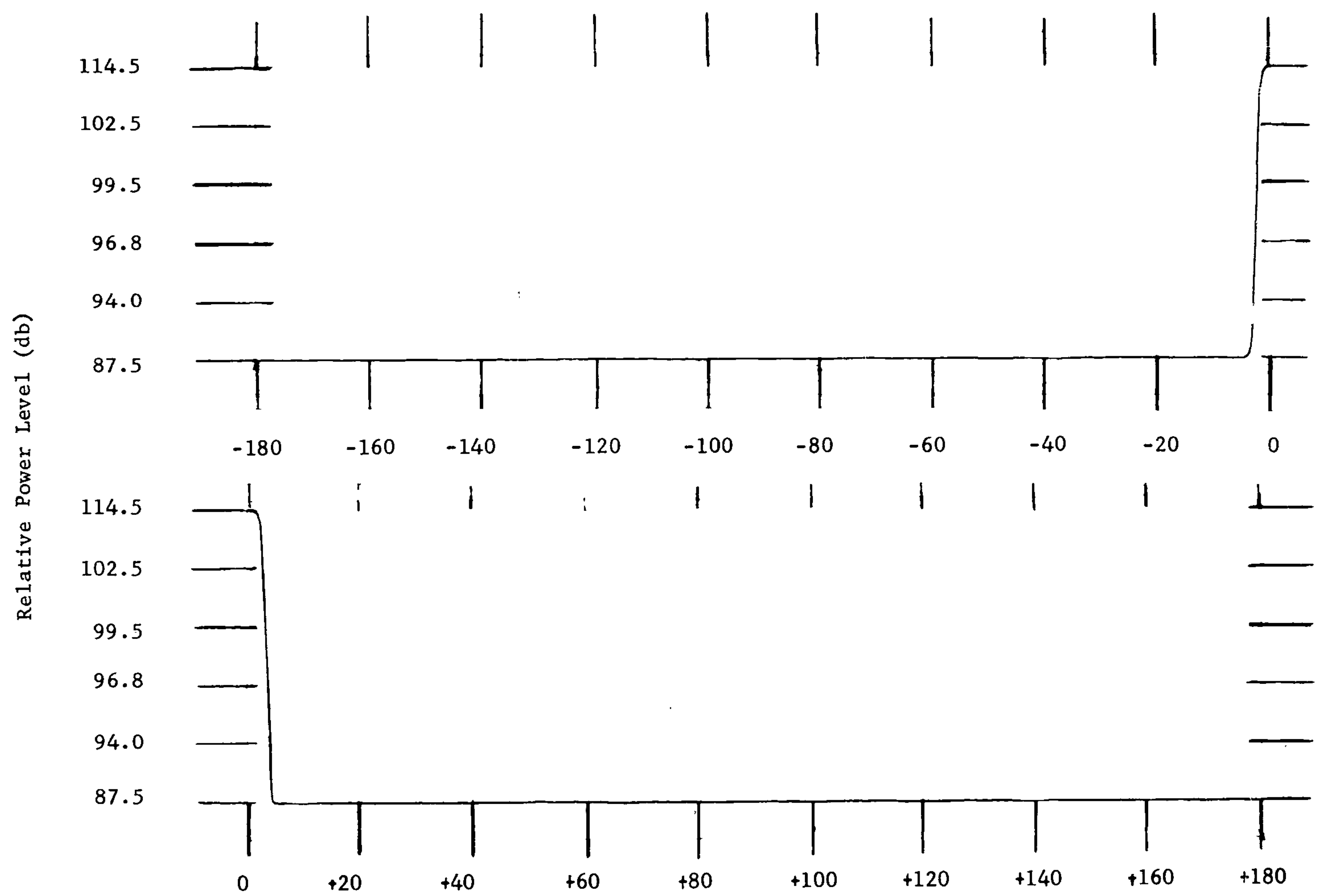


Figure 3.4.1.B Antenna Pattern - Horizontal Polarization
Fundamental Frequency - 1316.1 mc

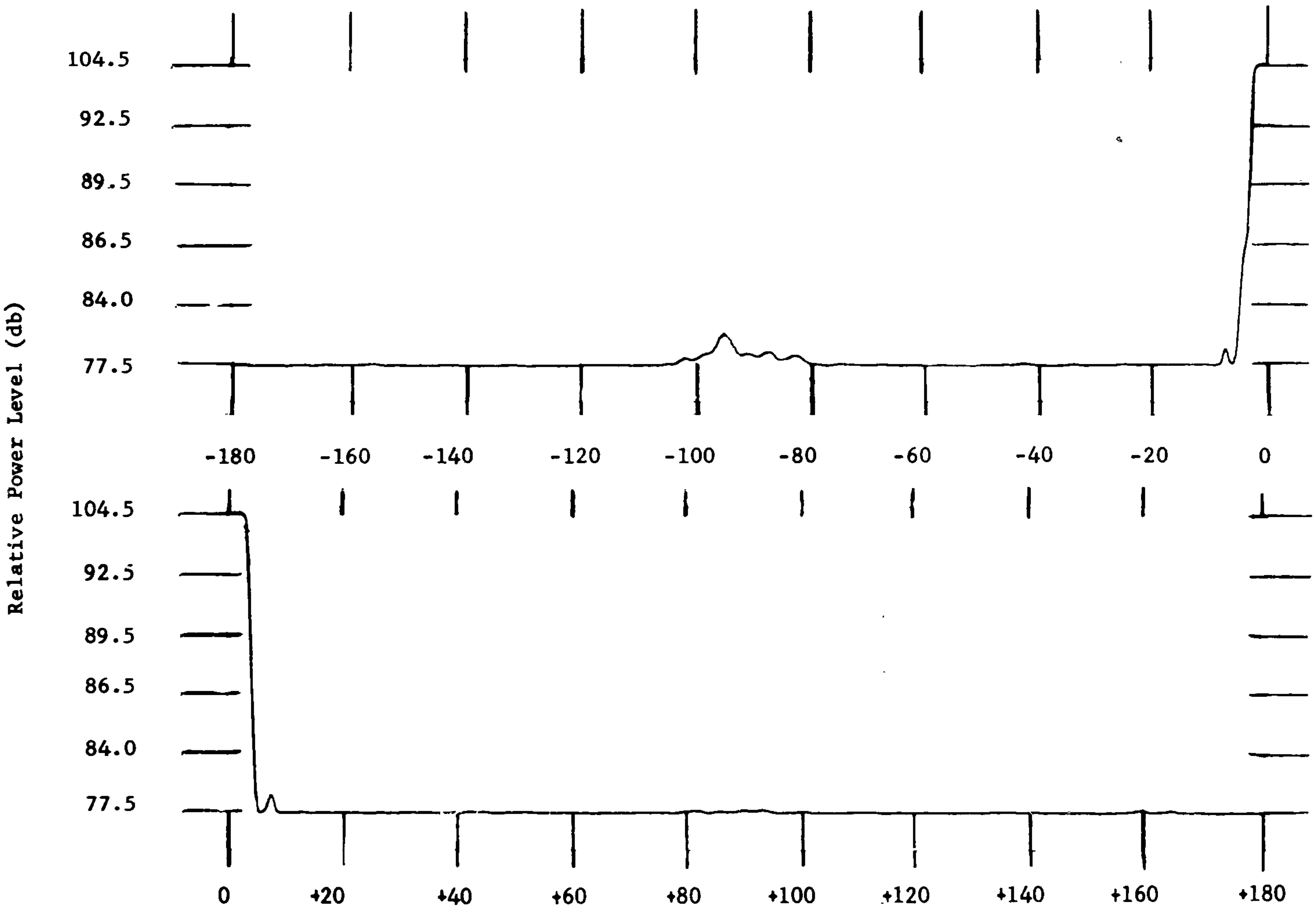


Figure 3.4.1.C Antenna Pattern - Horizontal Polarization
Fundamental Frequency - 1316.1 mc

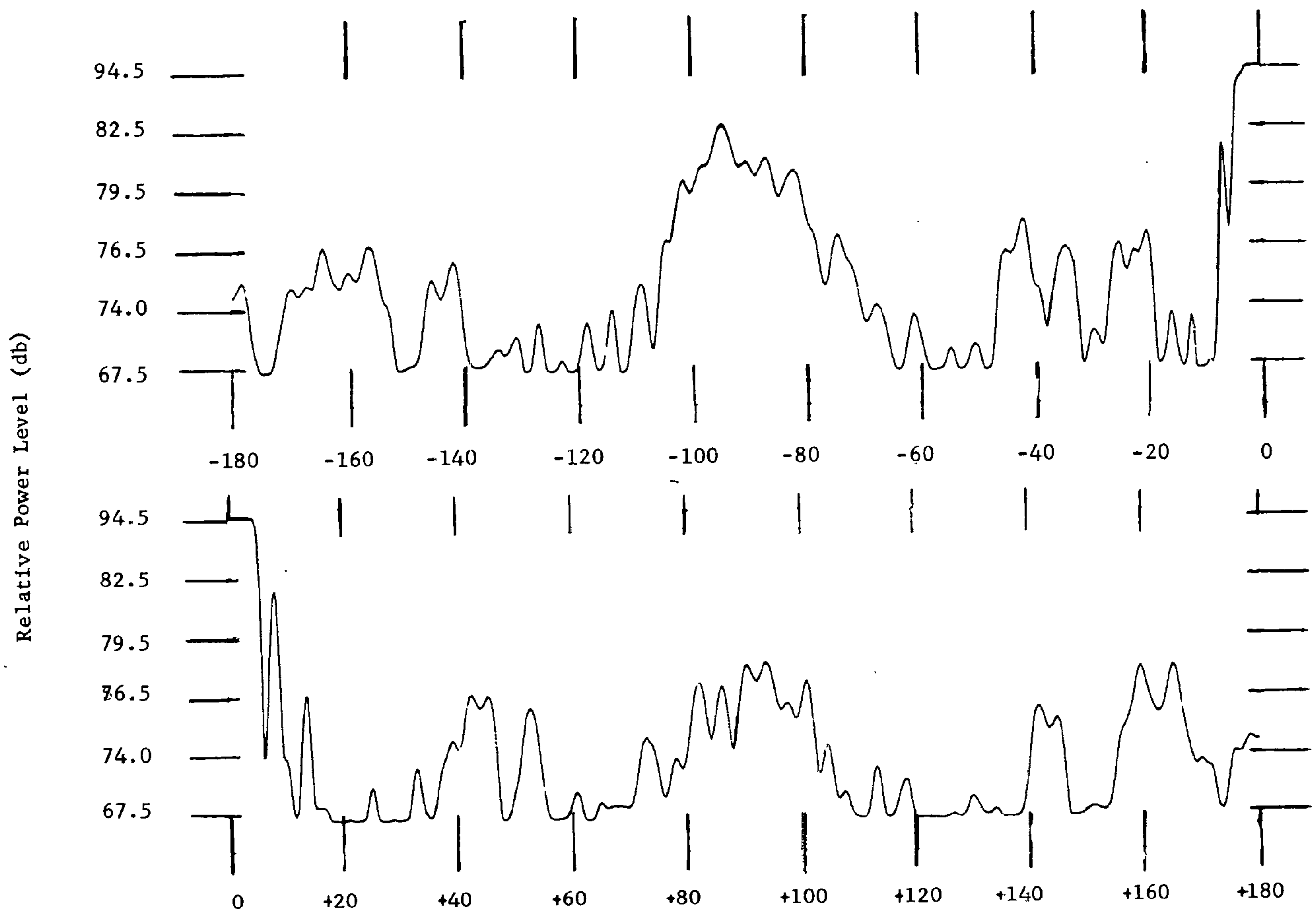


Figure 3.4.1.D Antenna Pattern - Horizontal Polarization
Fundemental Frequency - 1316.1 mc

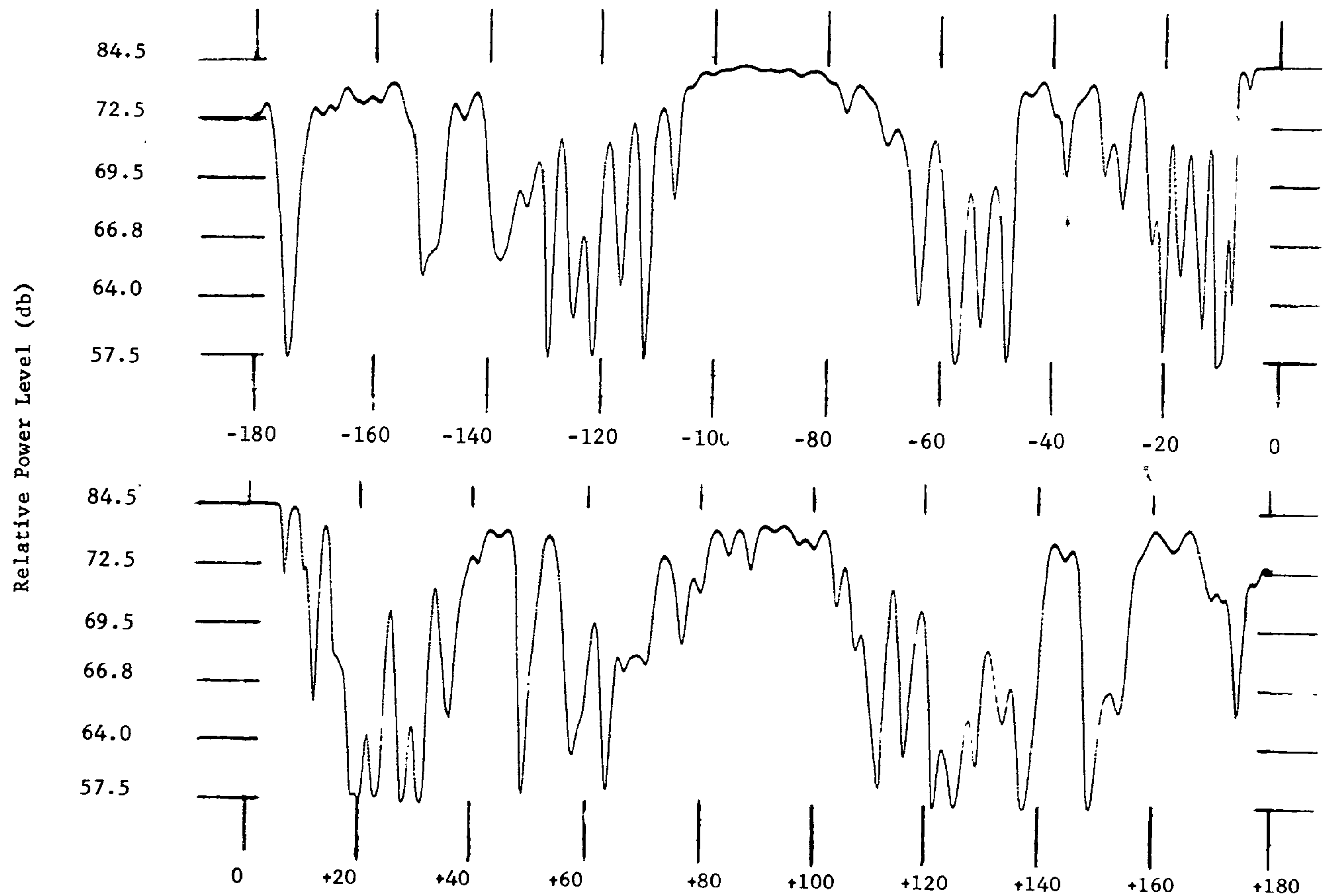


Figure 3.4.1.E Antenna Pattern - Horizontal Polarization
Fundamental Frequency - 1316.1 mc

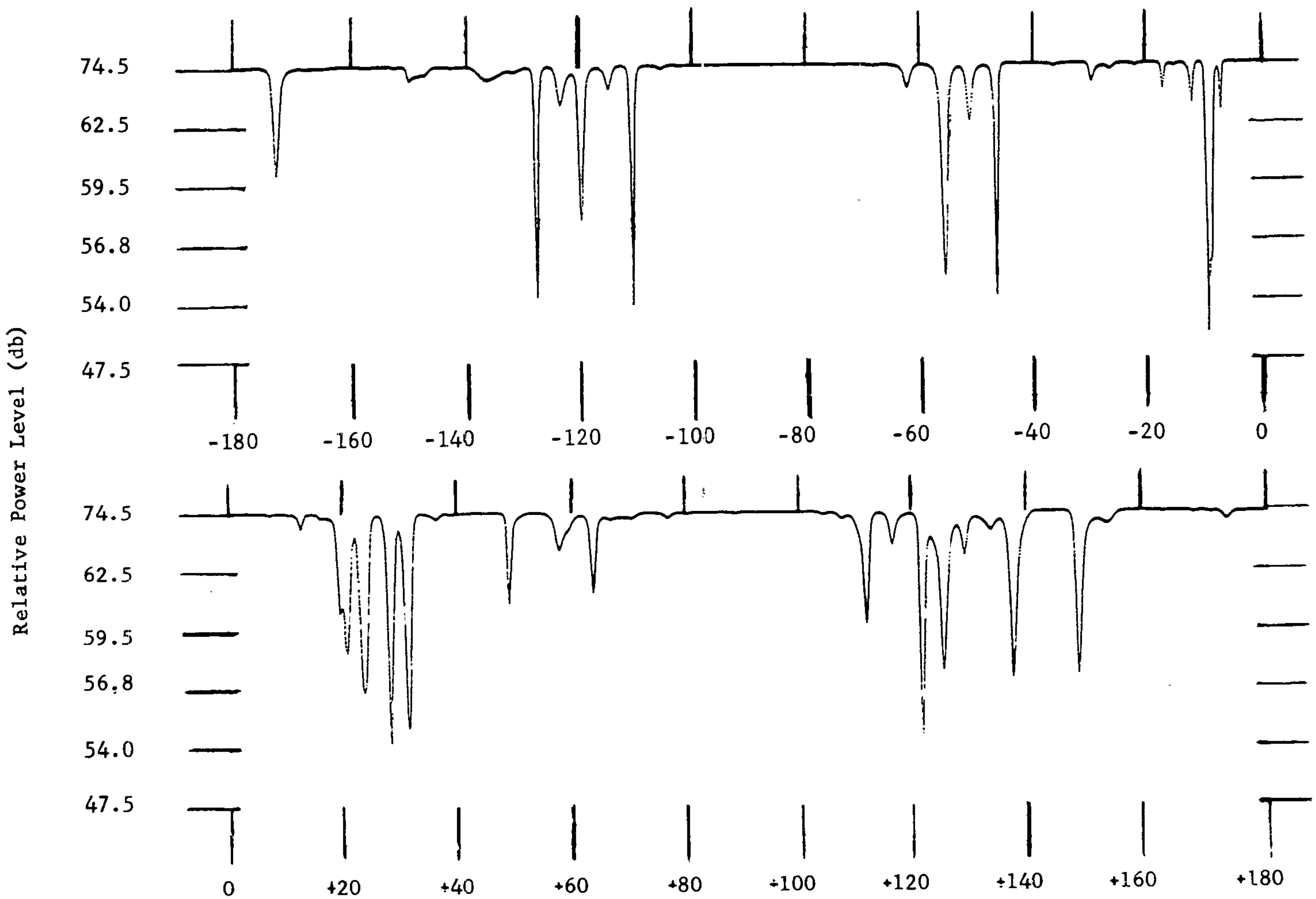


Figure 3.4.1.F Antenna Pattern - Horizontal Polarization
Fundamental Frequency - 1316.1 mc

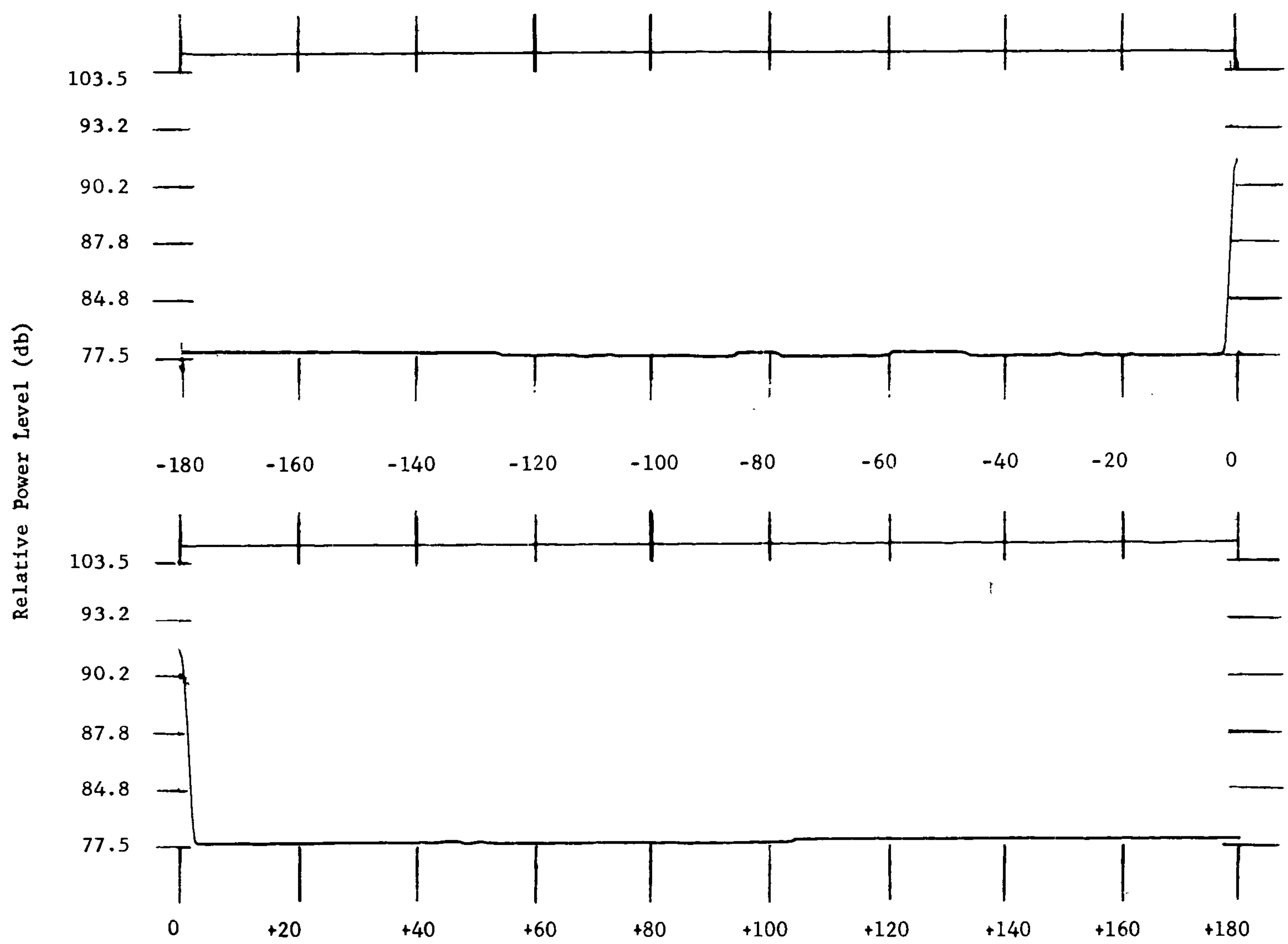


Figure 3.4.2.A Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc

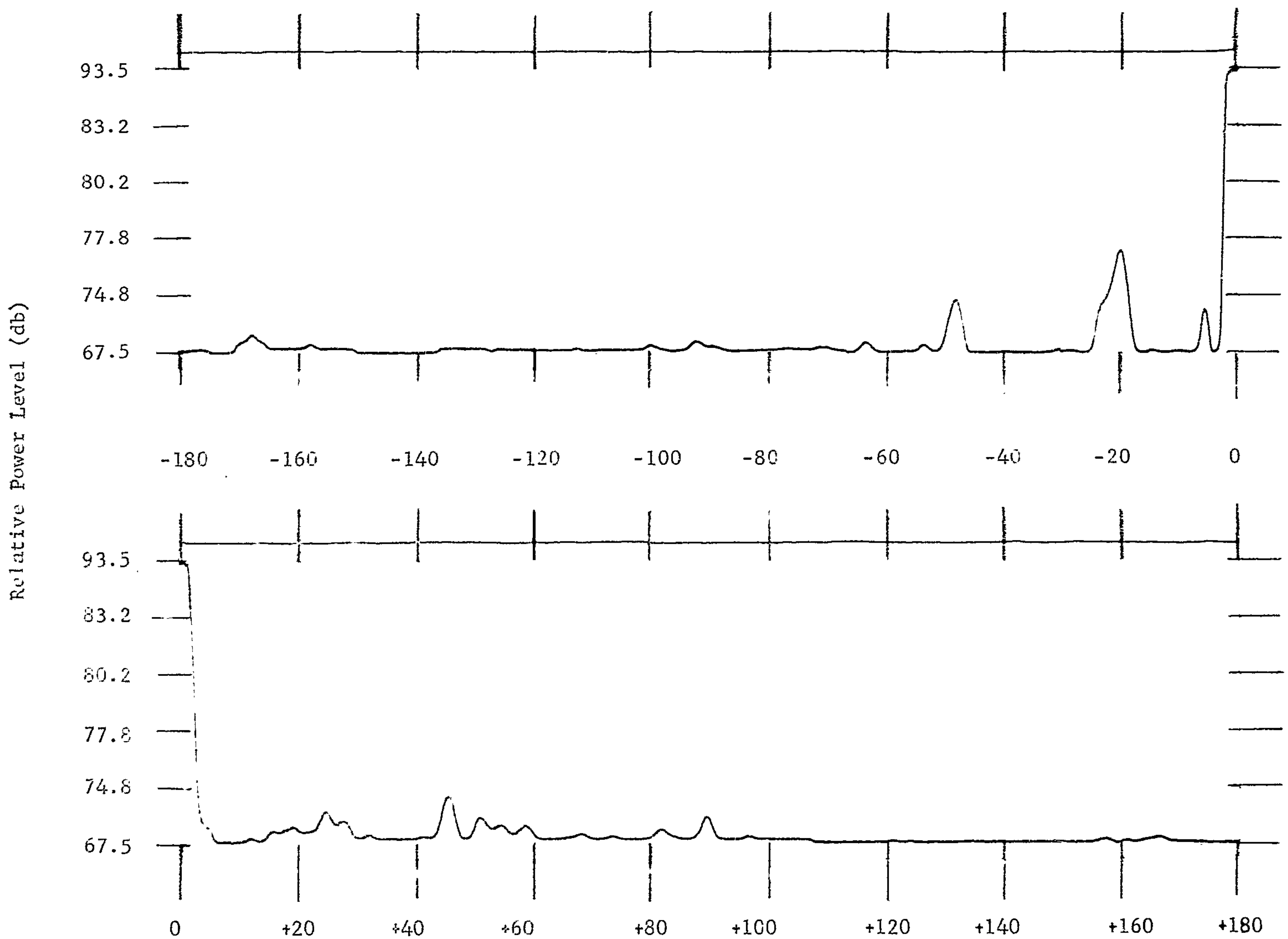


Figure 3.4.2.B Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc

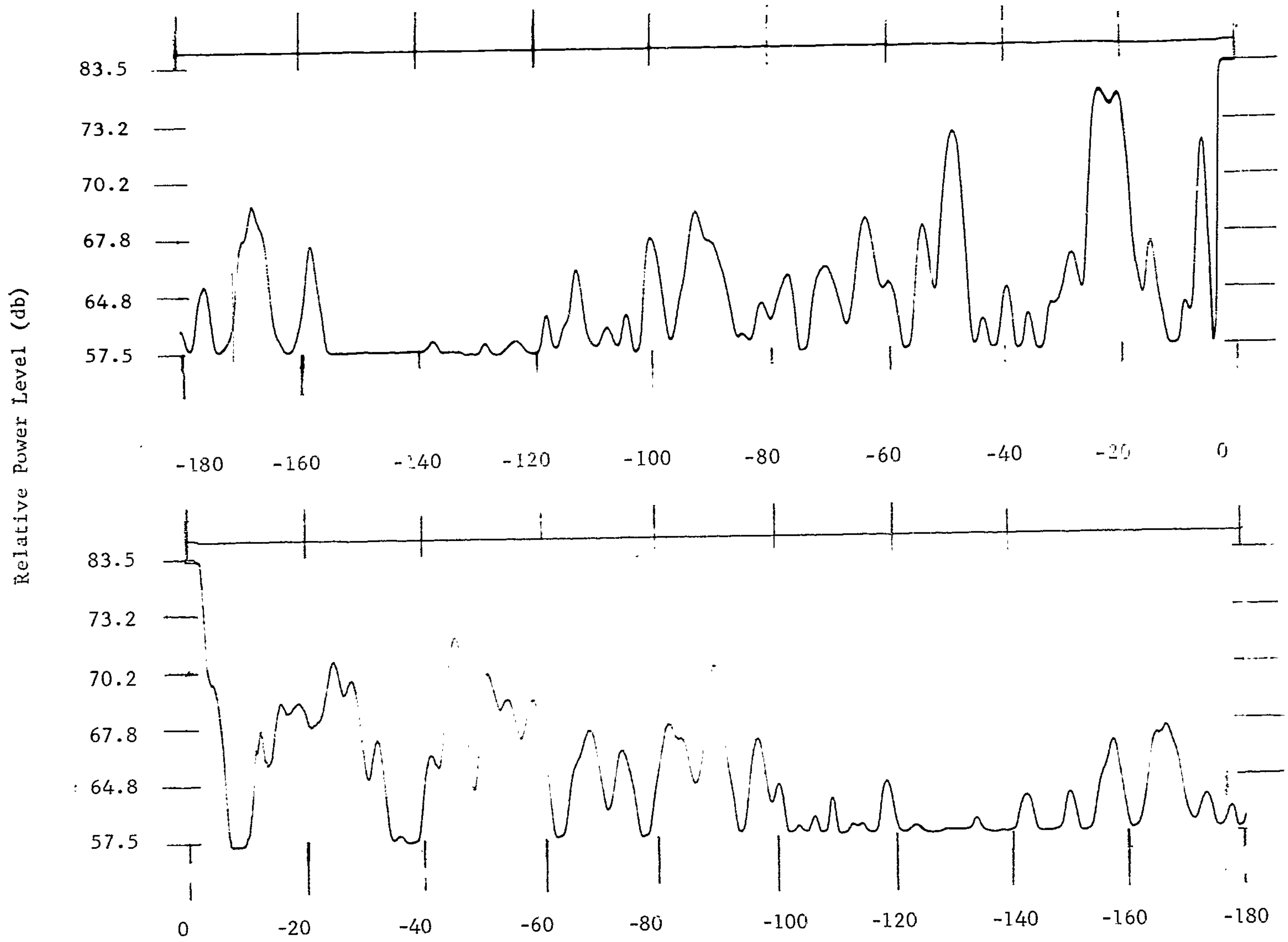


Figure 3.4.2.C Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc

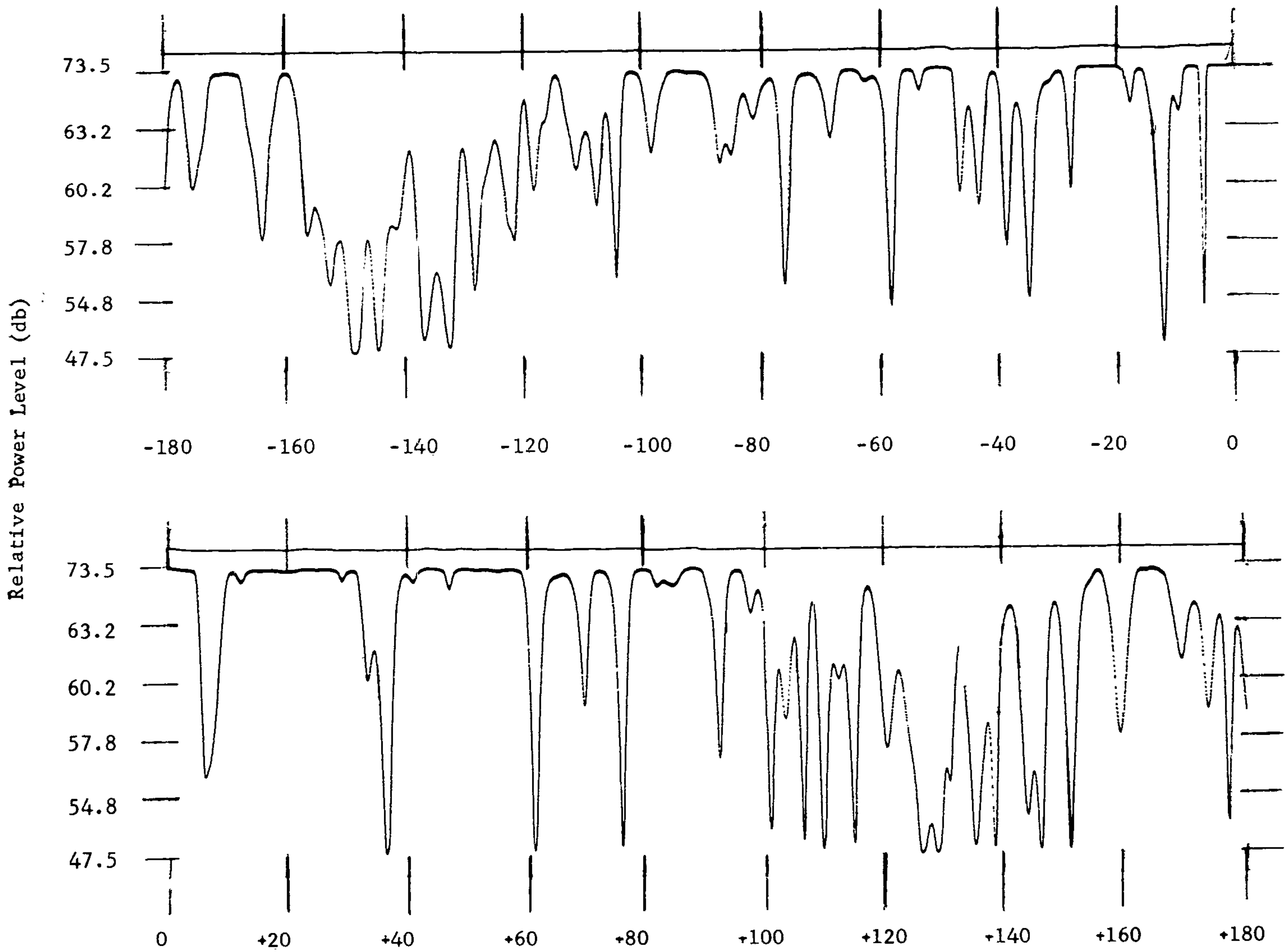


Figure 3.4.2.D Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc

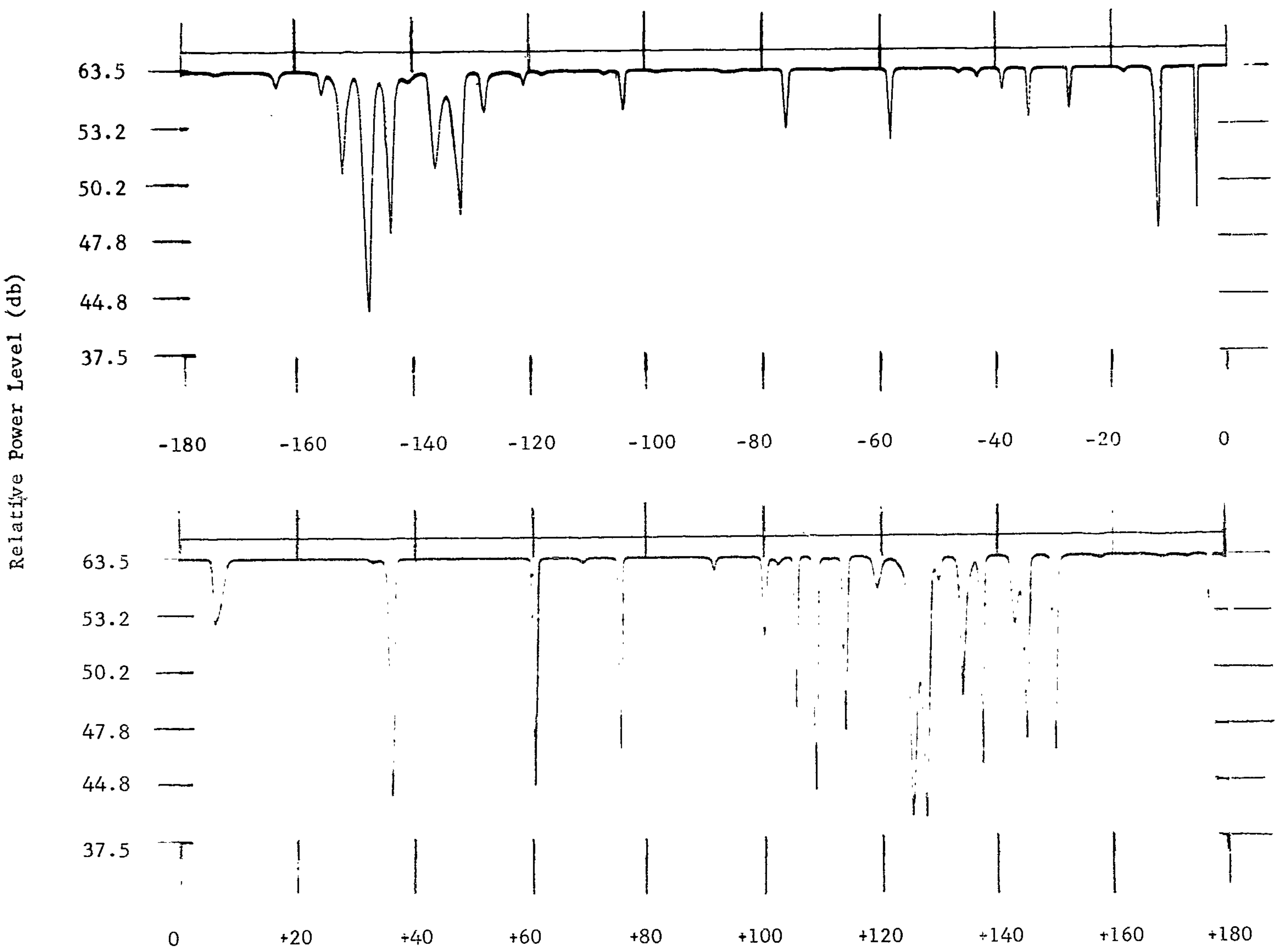


Figure 3.4.2.E Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc

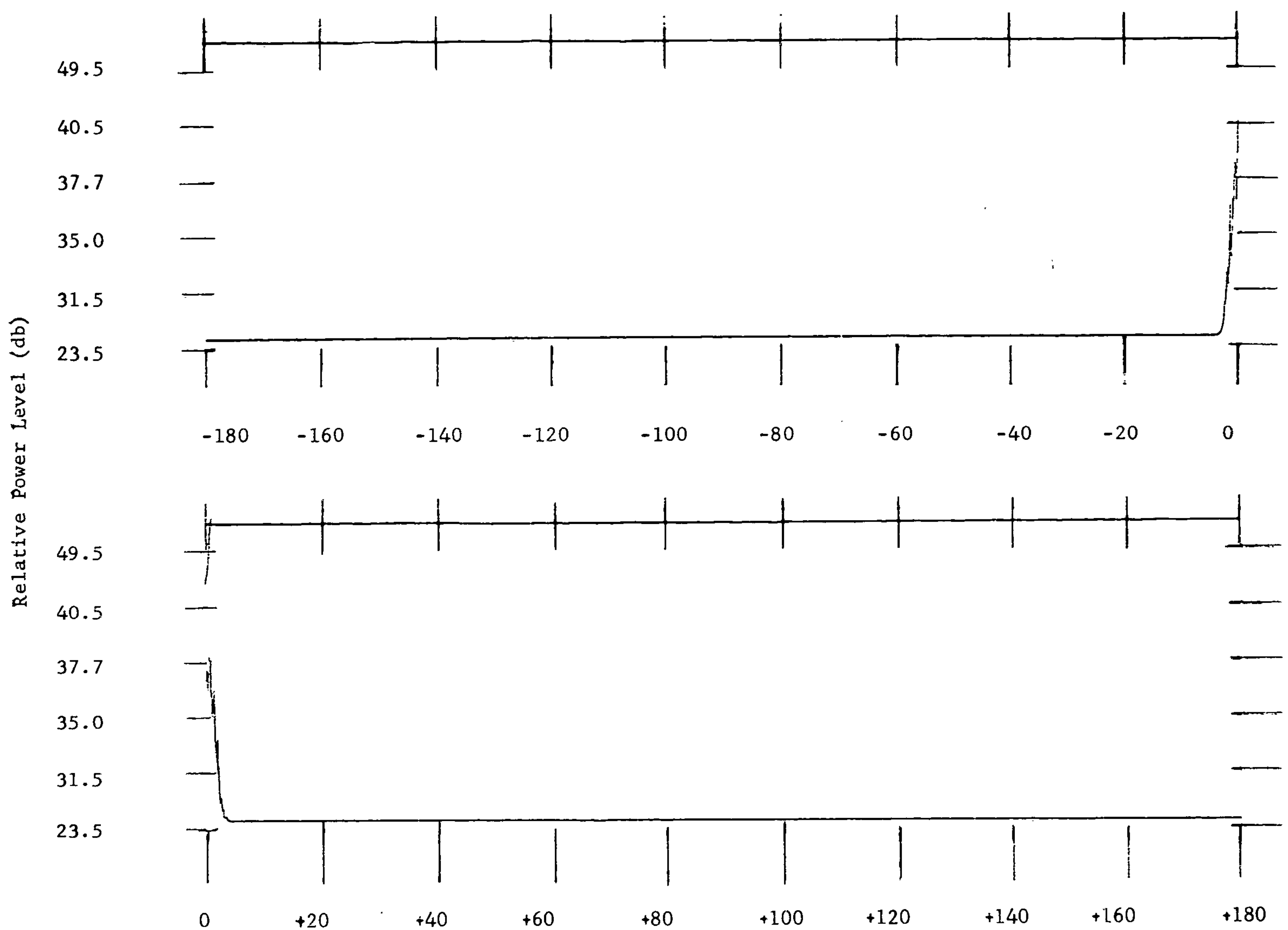


Figure 3.4.3.A Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1135.0 mc

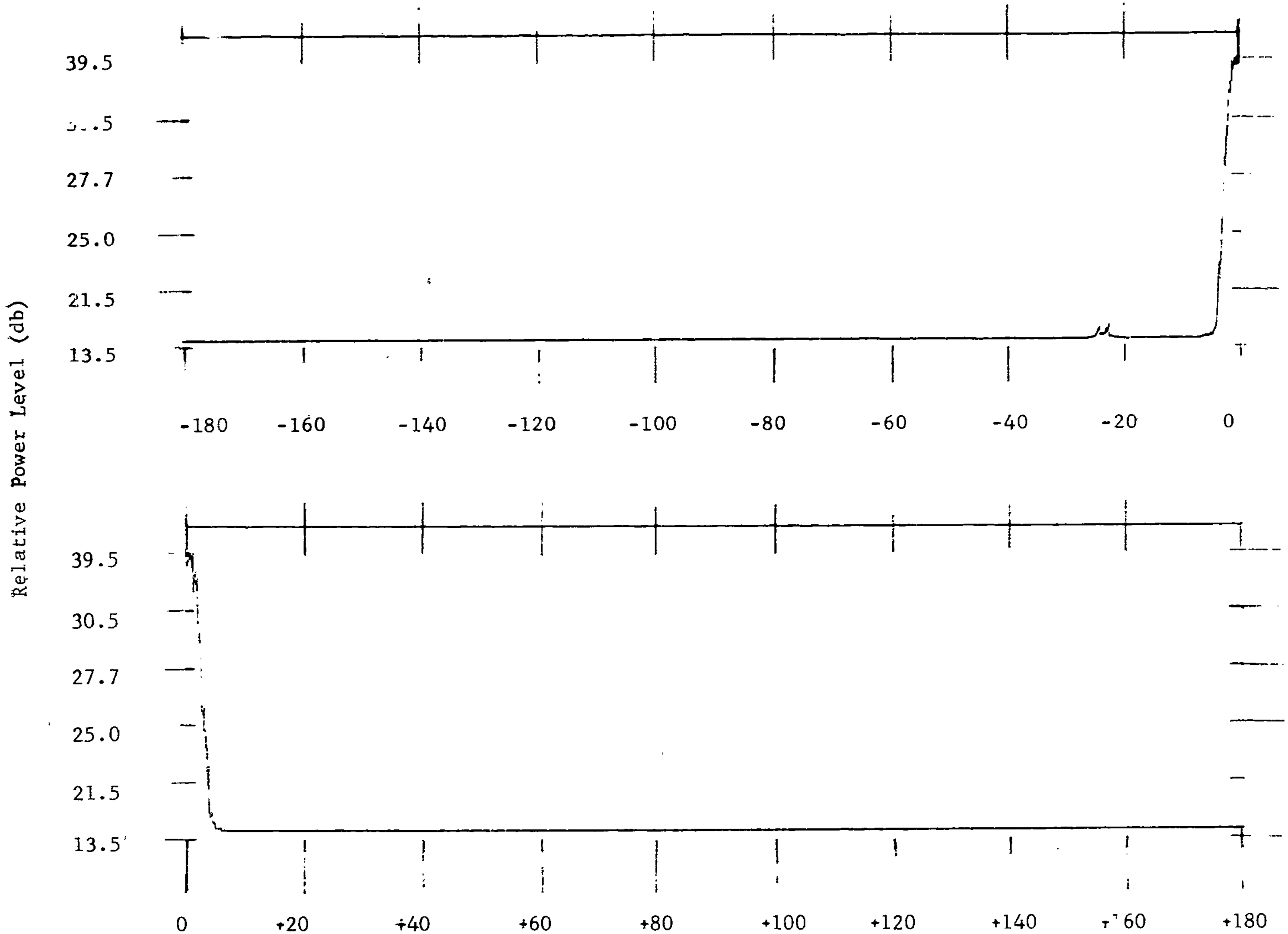


Figure 3.4.3.B Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1135.0 mc

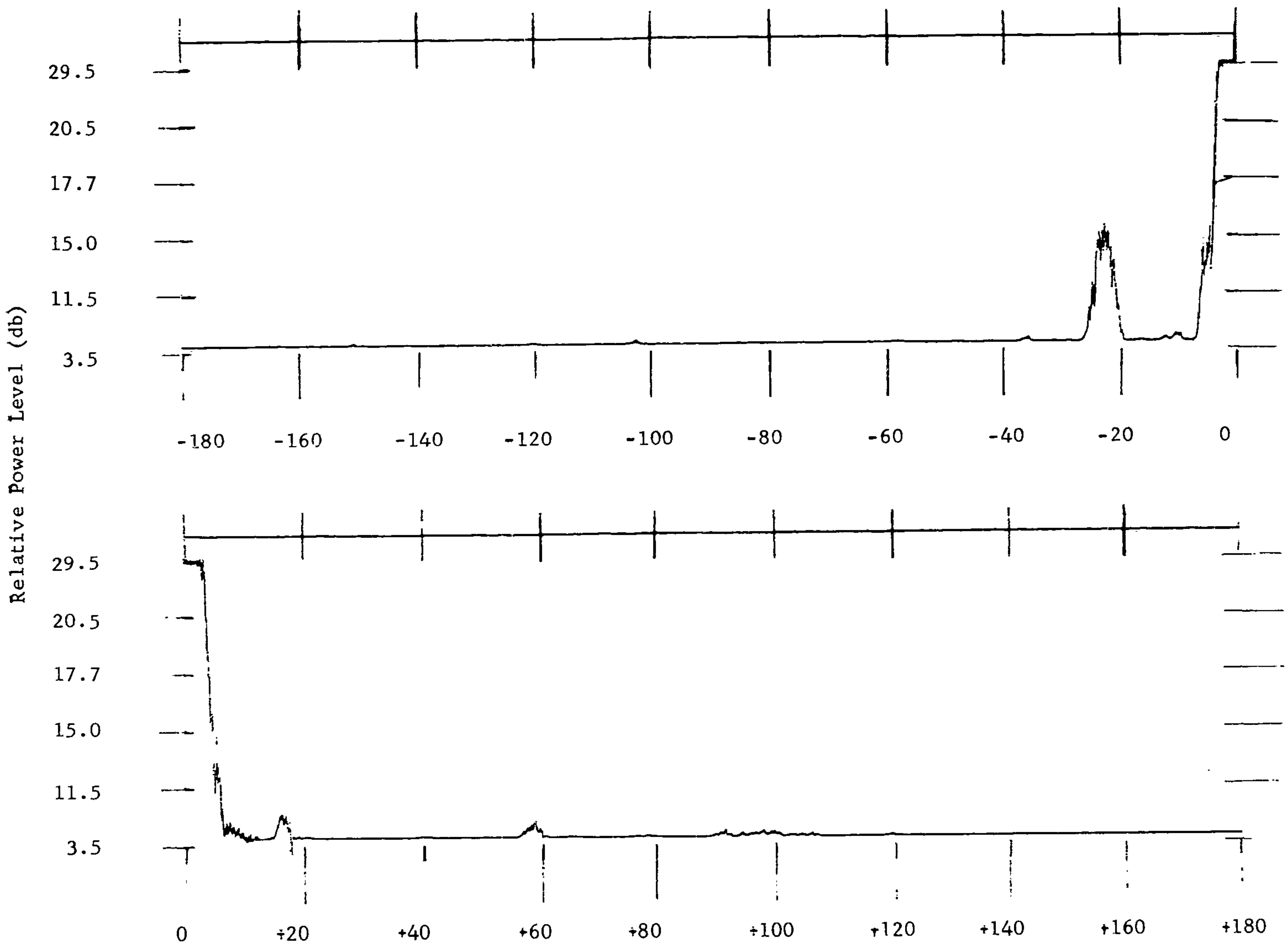


Figure 3.4.3.C Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1135.0 mc

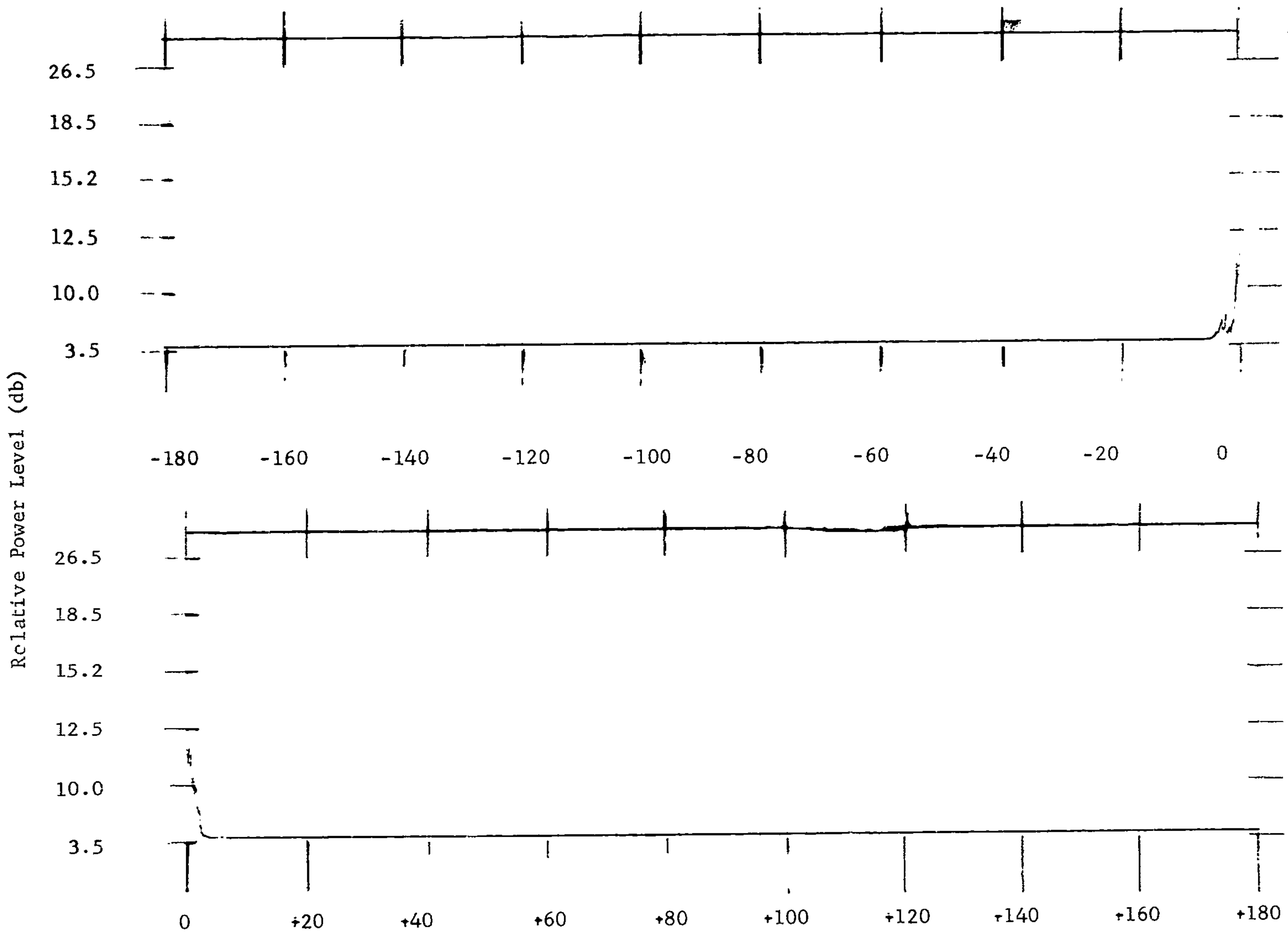


Figure 3.4.4 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1135.0 mc

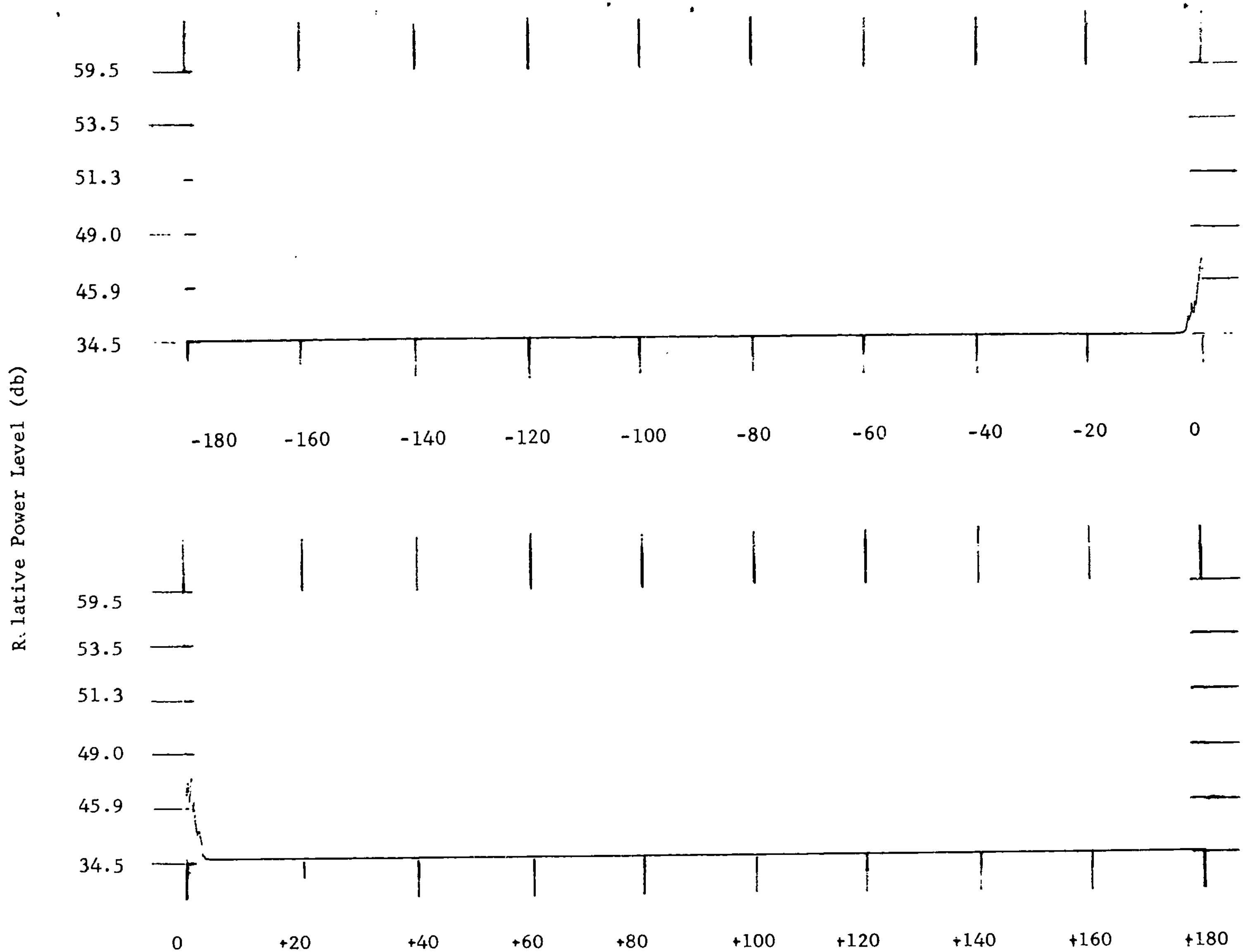


Figure 3.4.5.A Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1499.3 mc

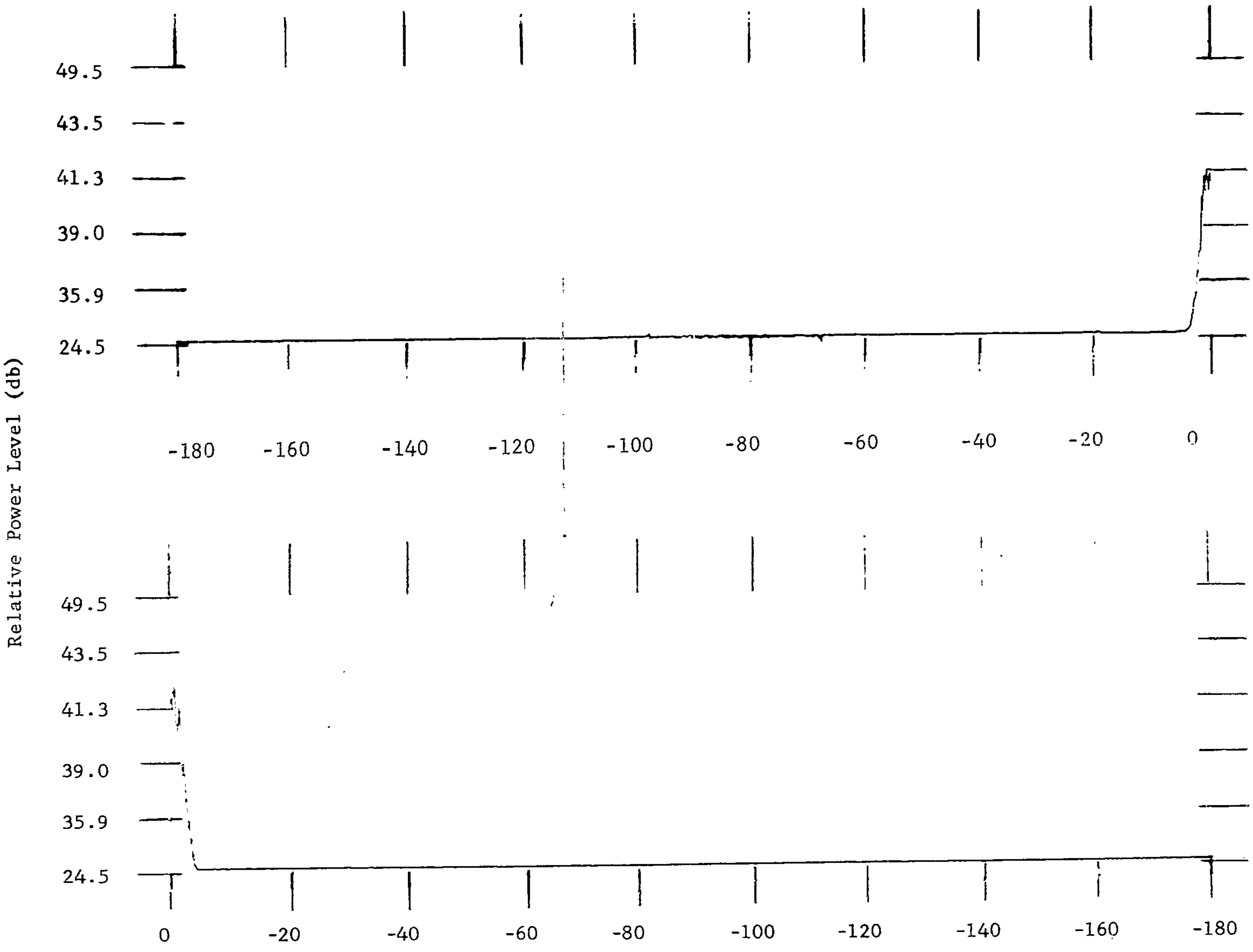


Figure 3.4,5.B Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1499.3 mc

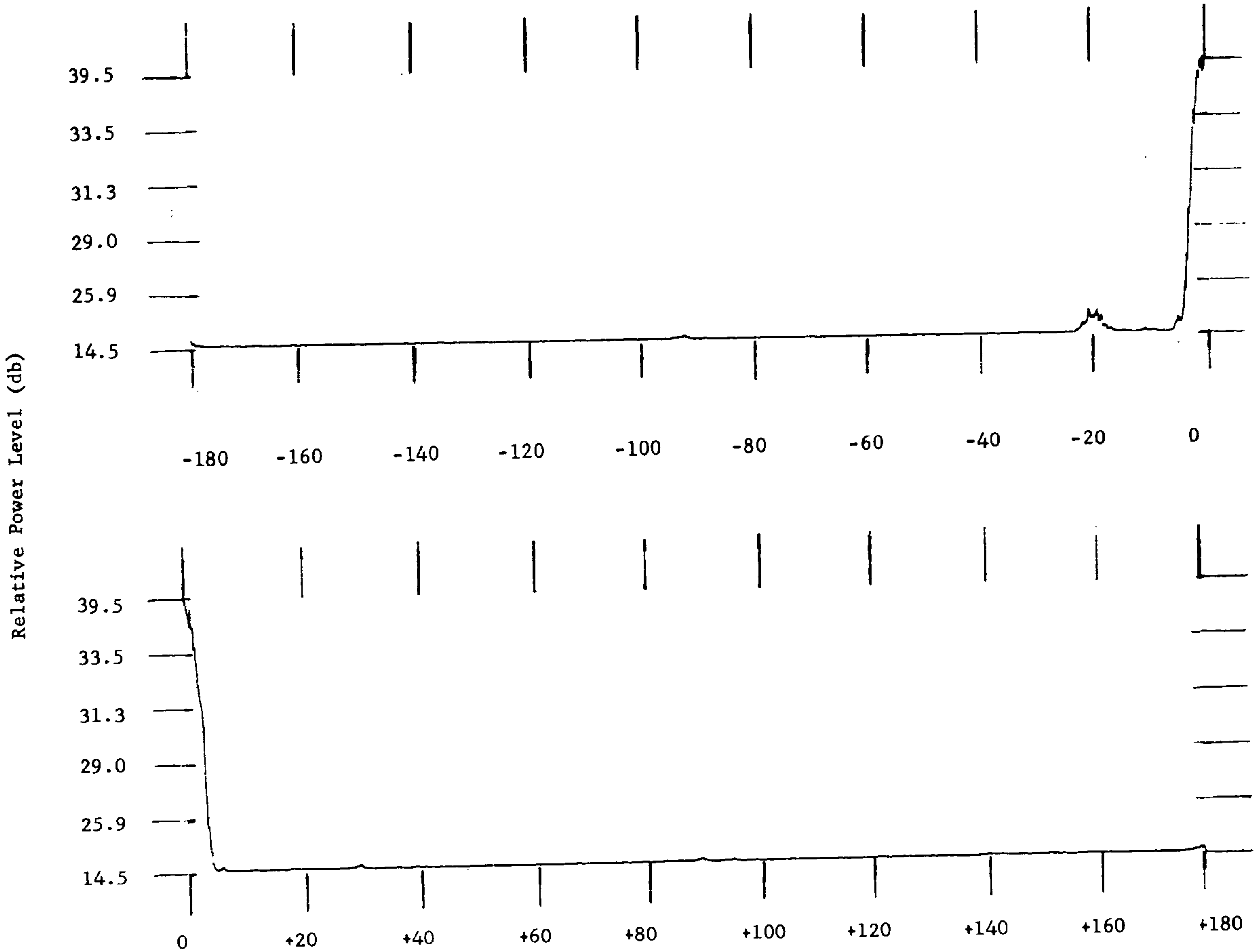


Figure 3.4.5.C Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1499.3 mc

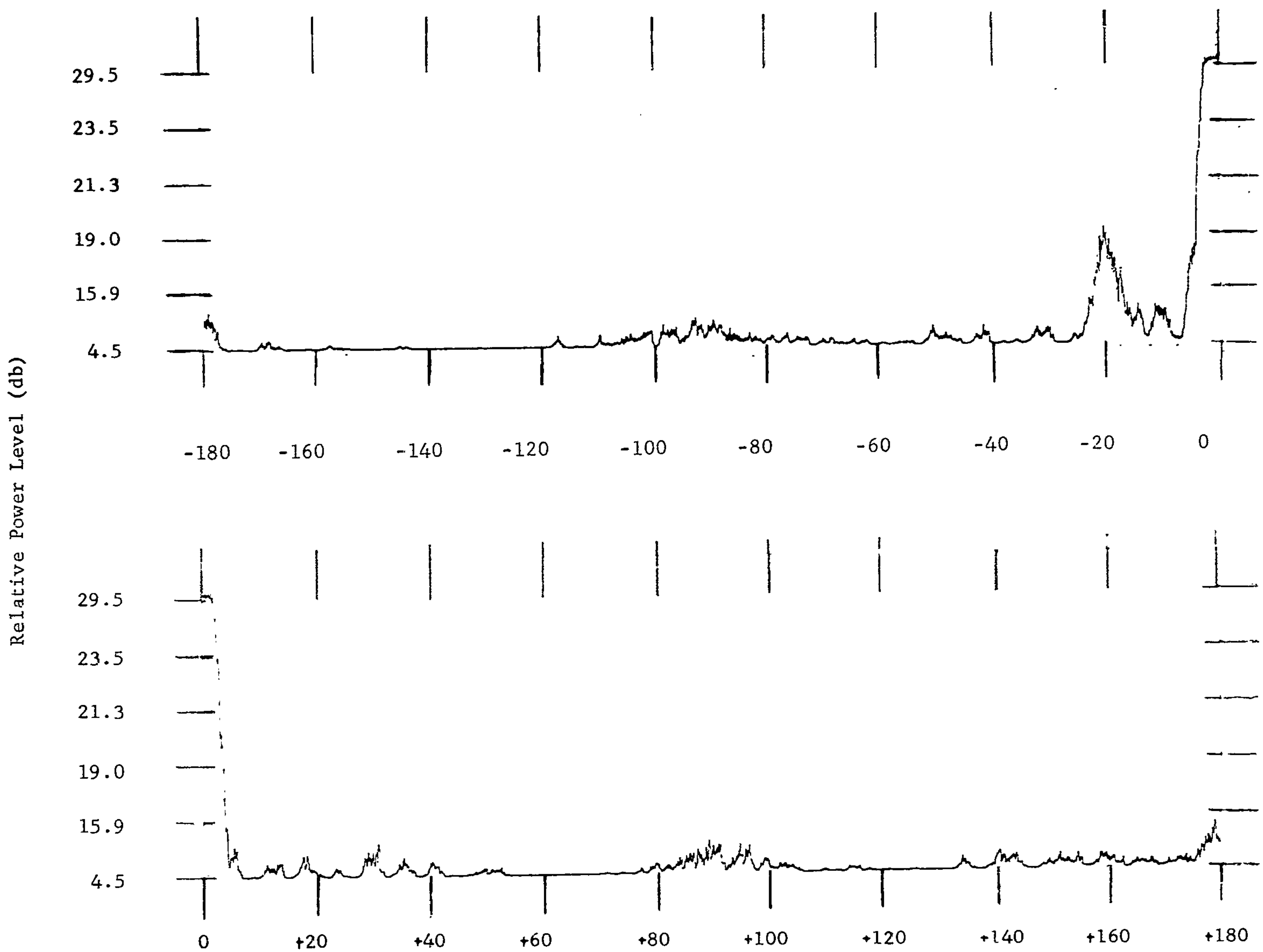


Figure 3.4.5.D Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1499.3 mc

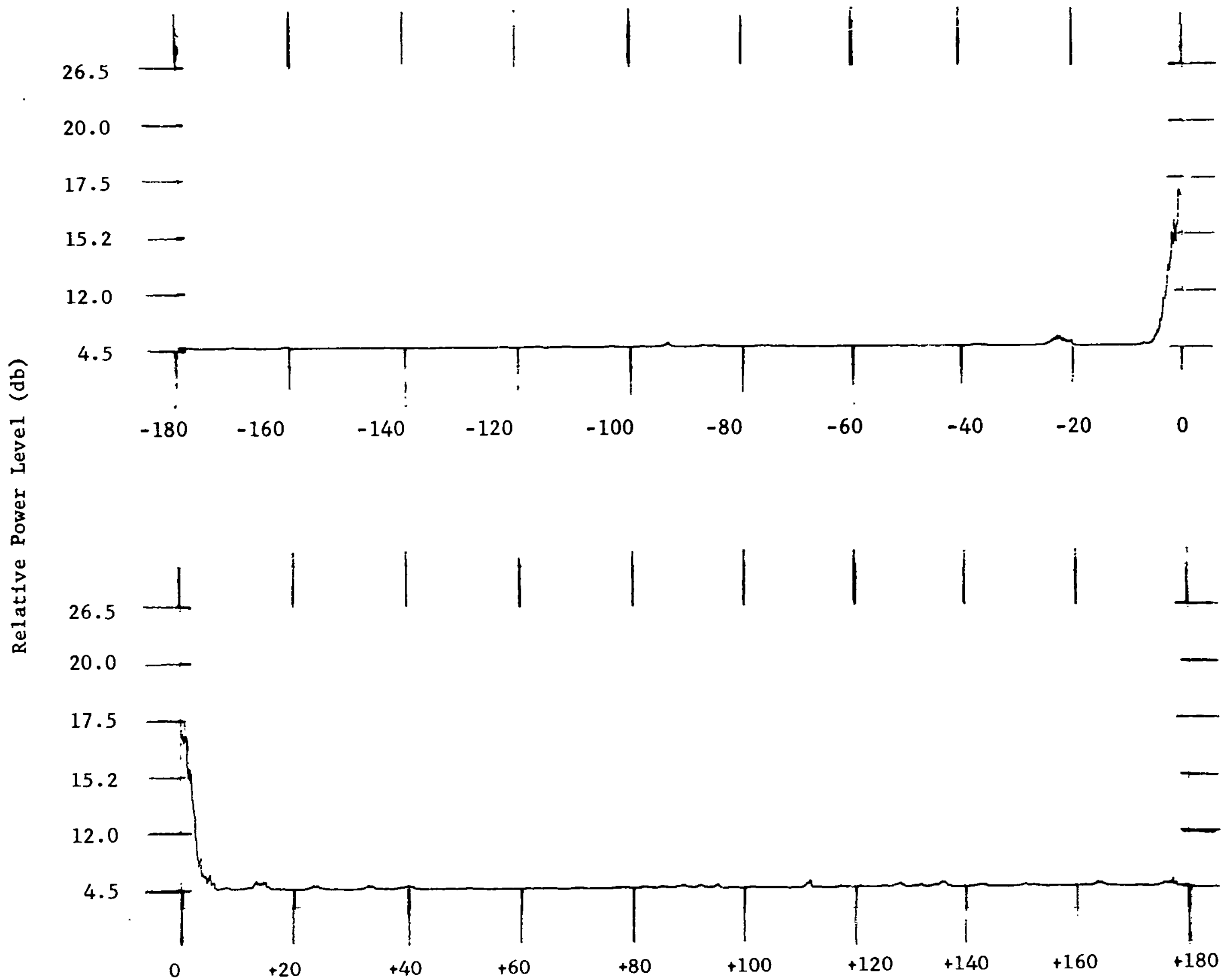


Figure 3.4.6. Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1499.3 mc

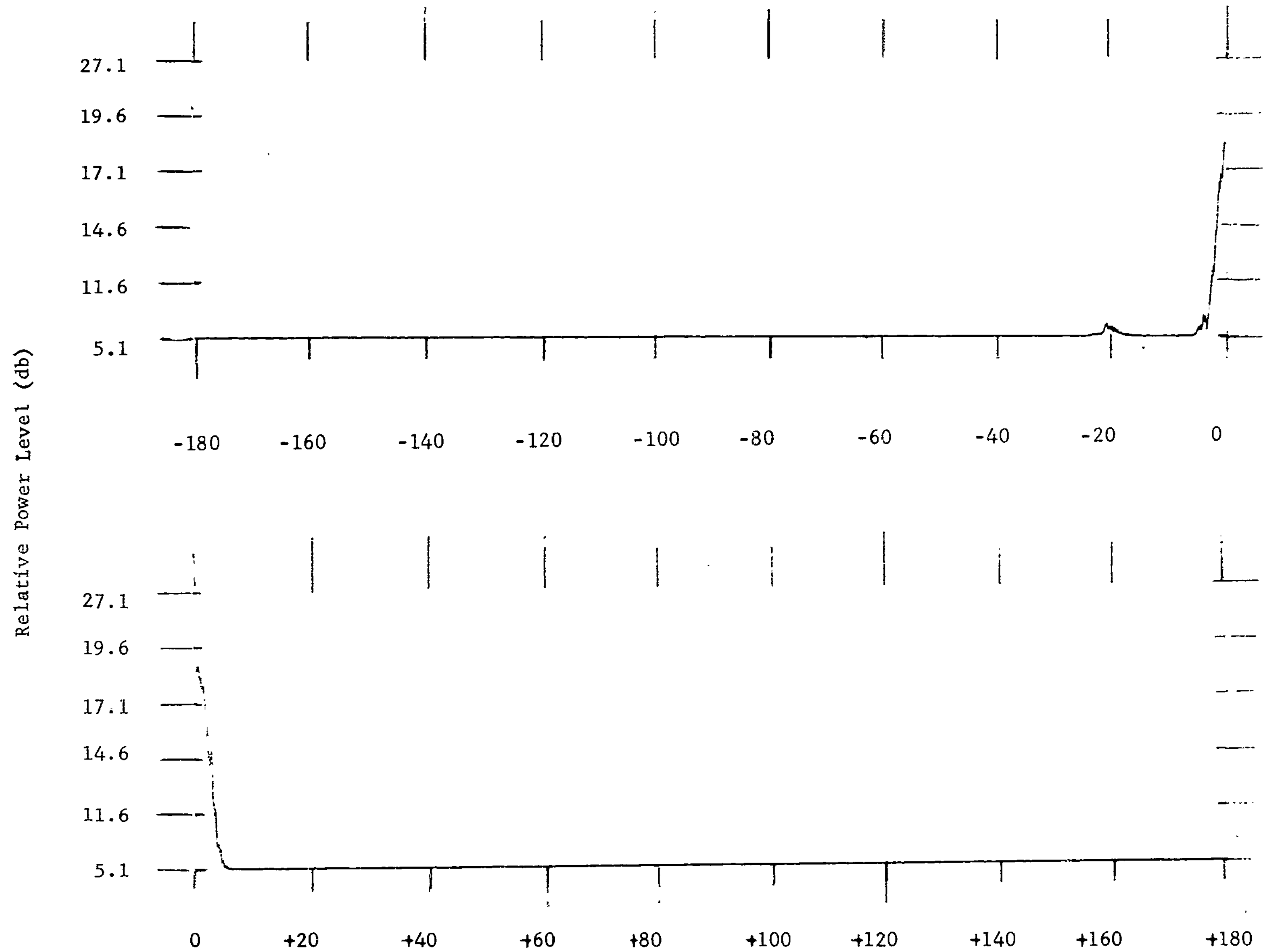


Figure 3.4.7 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1662.5 mc

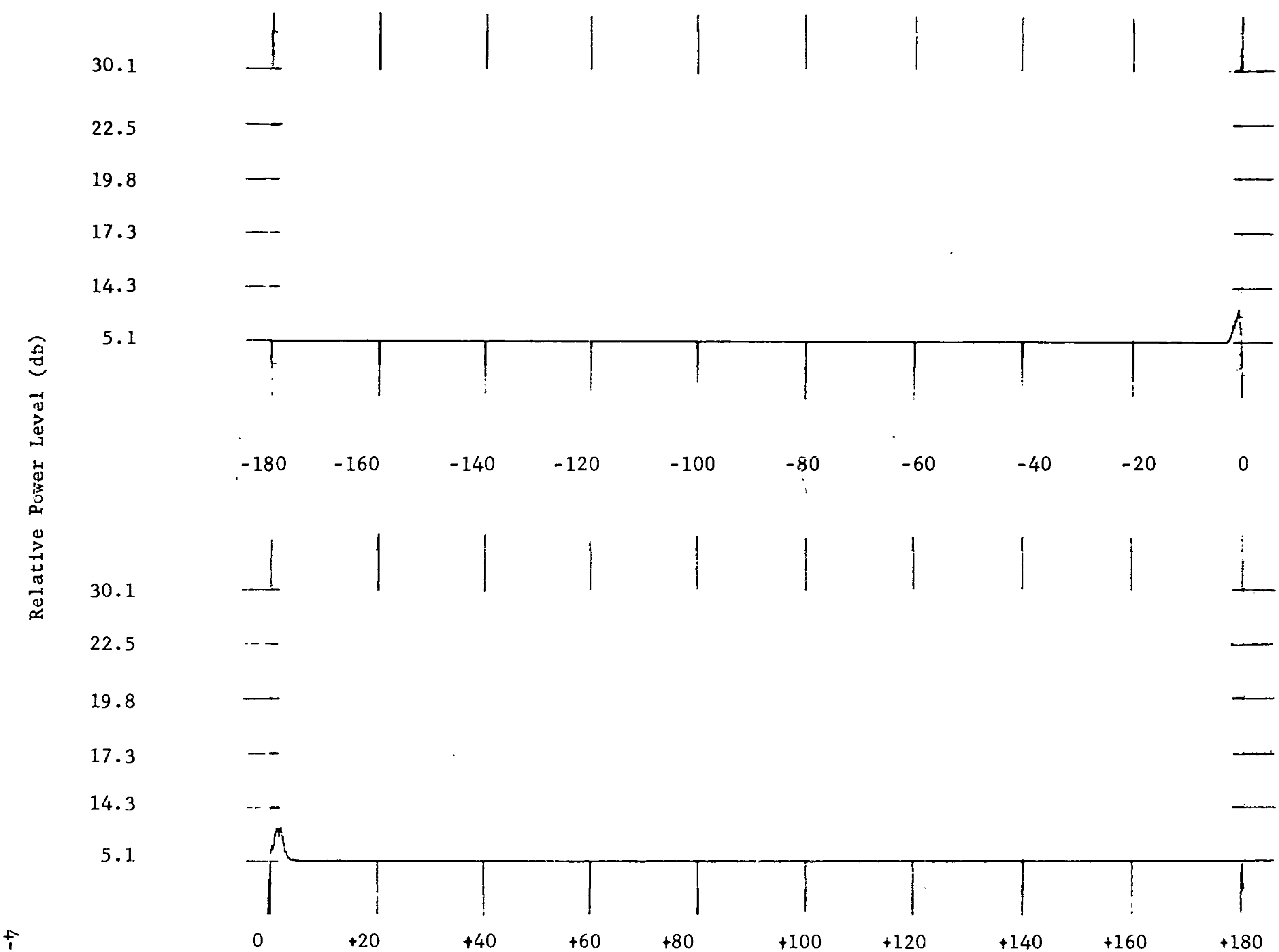


Figure 3.4.8 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1662.5 mc

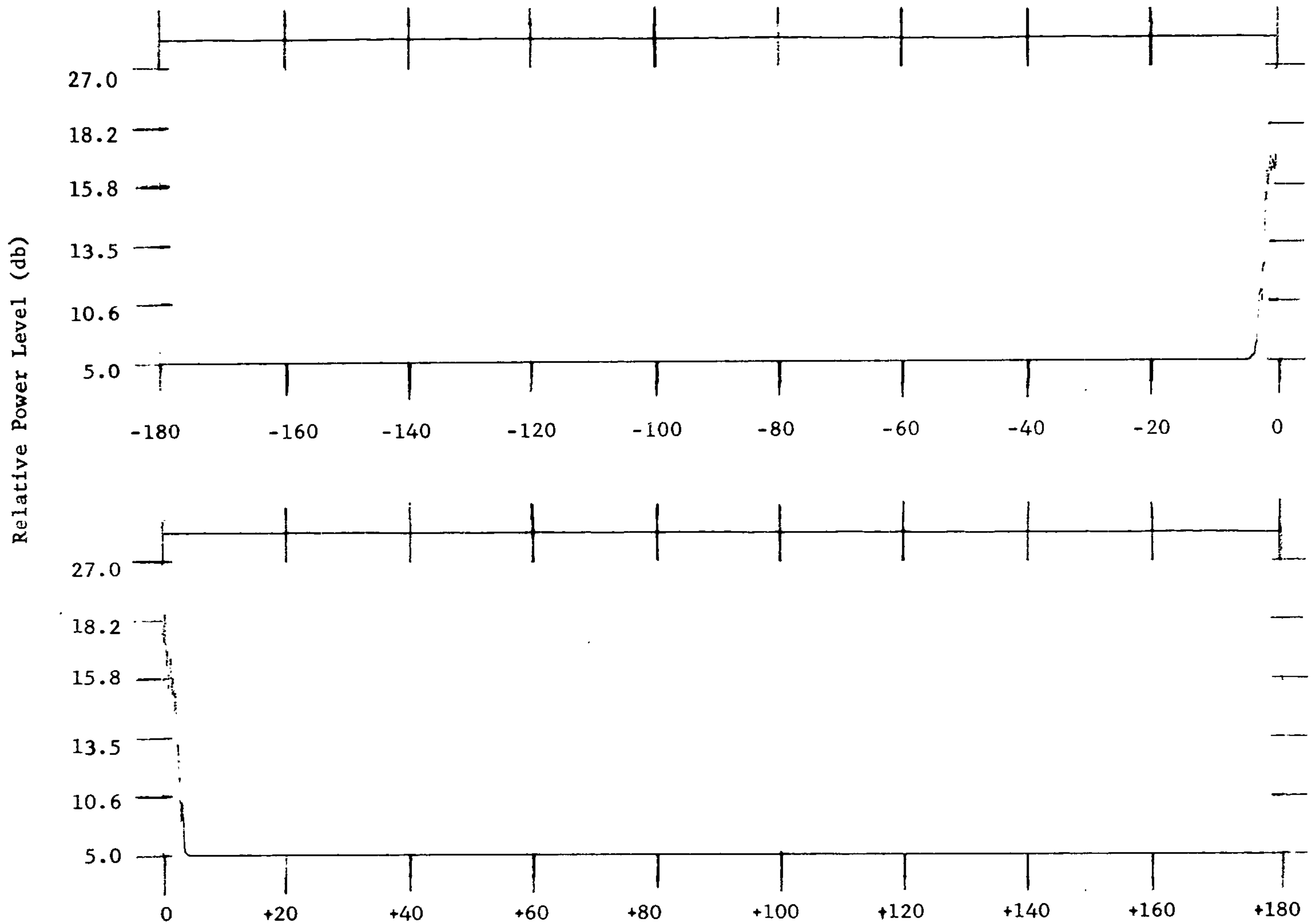


Figure 3.4.9 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2099.5 mc

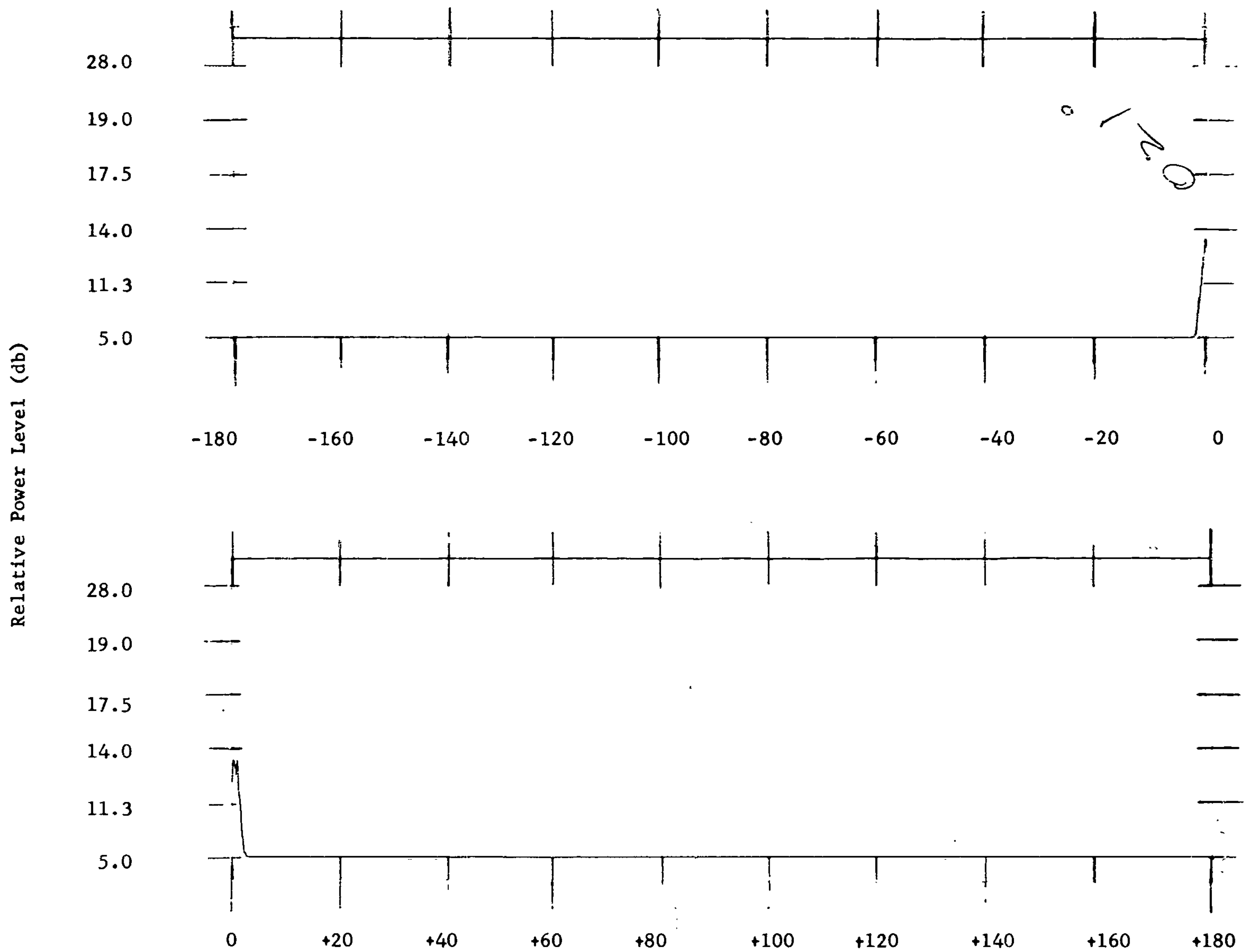


Figure 3.4.10 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2099.5 mc

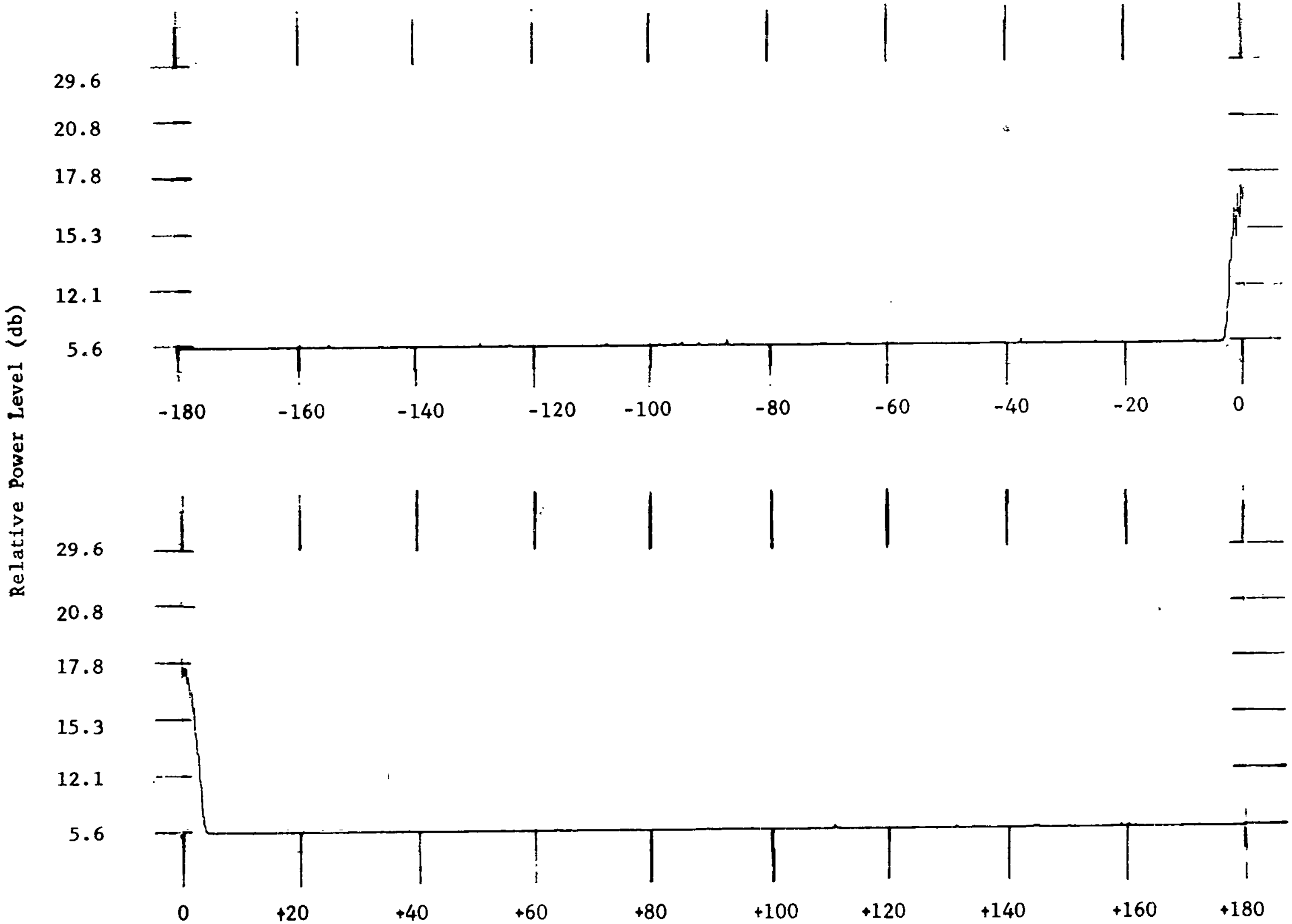


Figure 3.4.11 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1751.5 mc

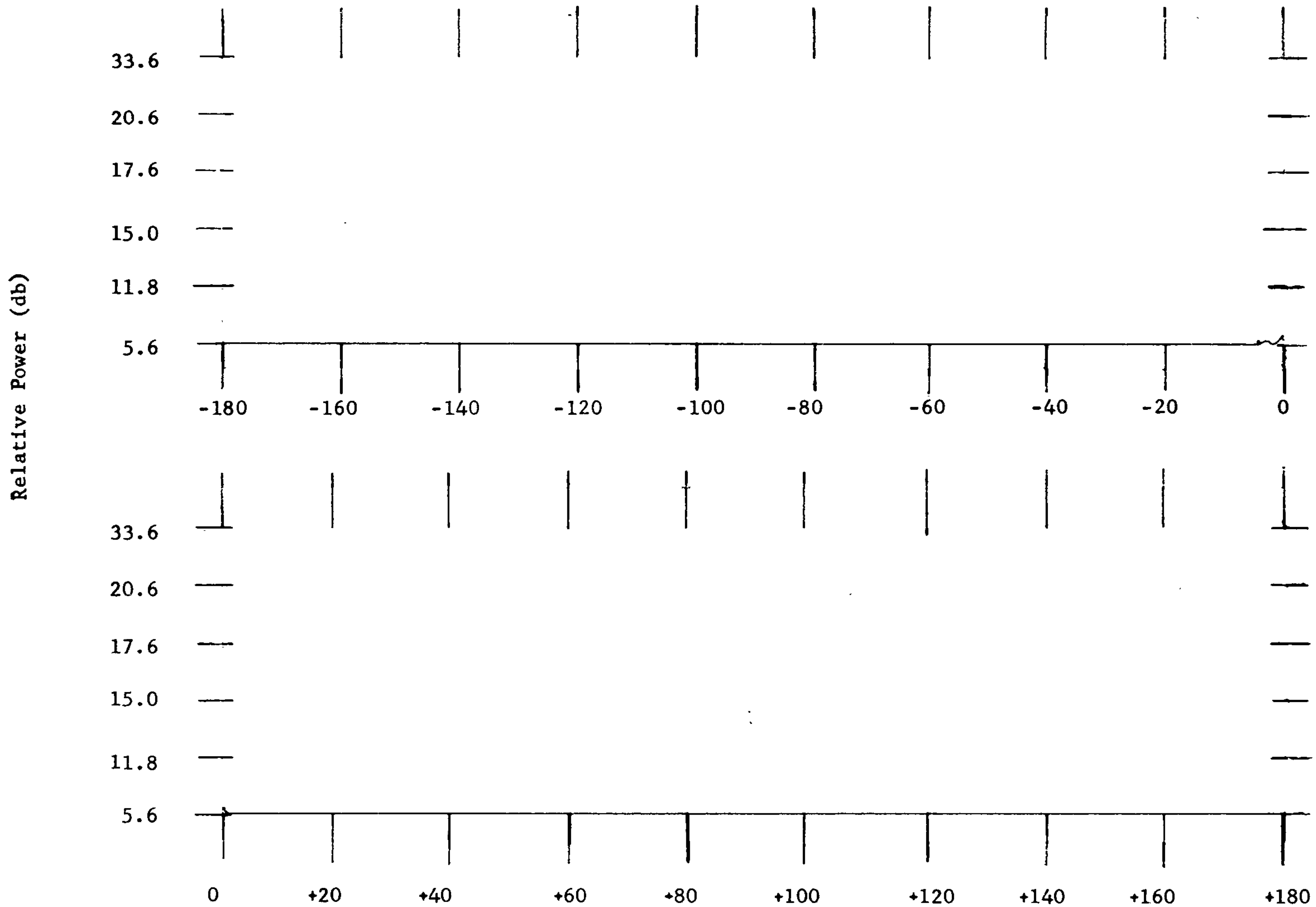


Figure 3.4.12 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1751.5 mc

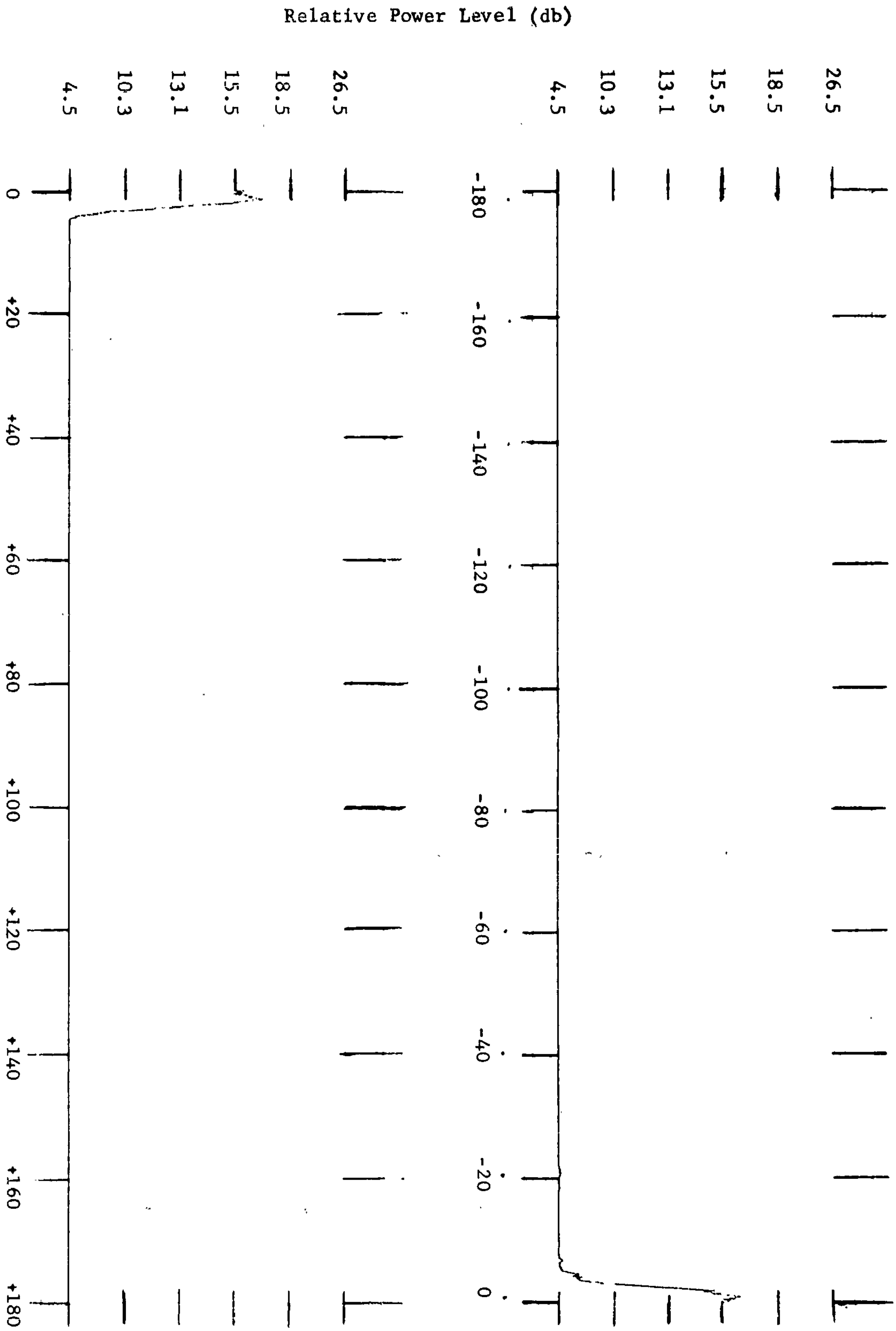


Figure 3.4.13 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1823.8 mc

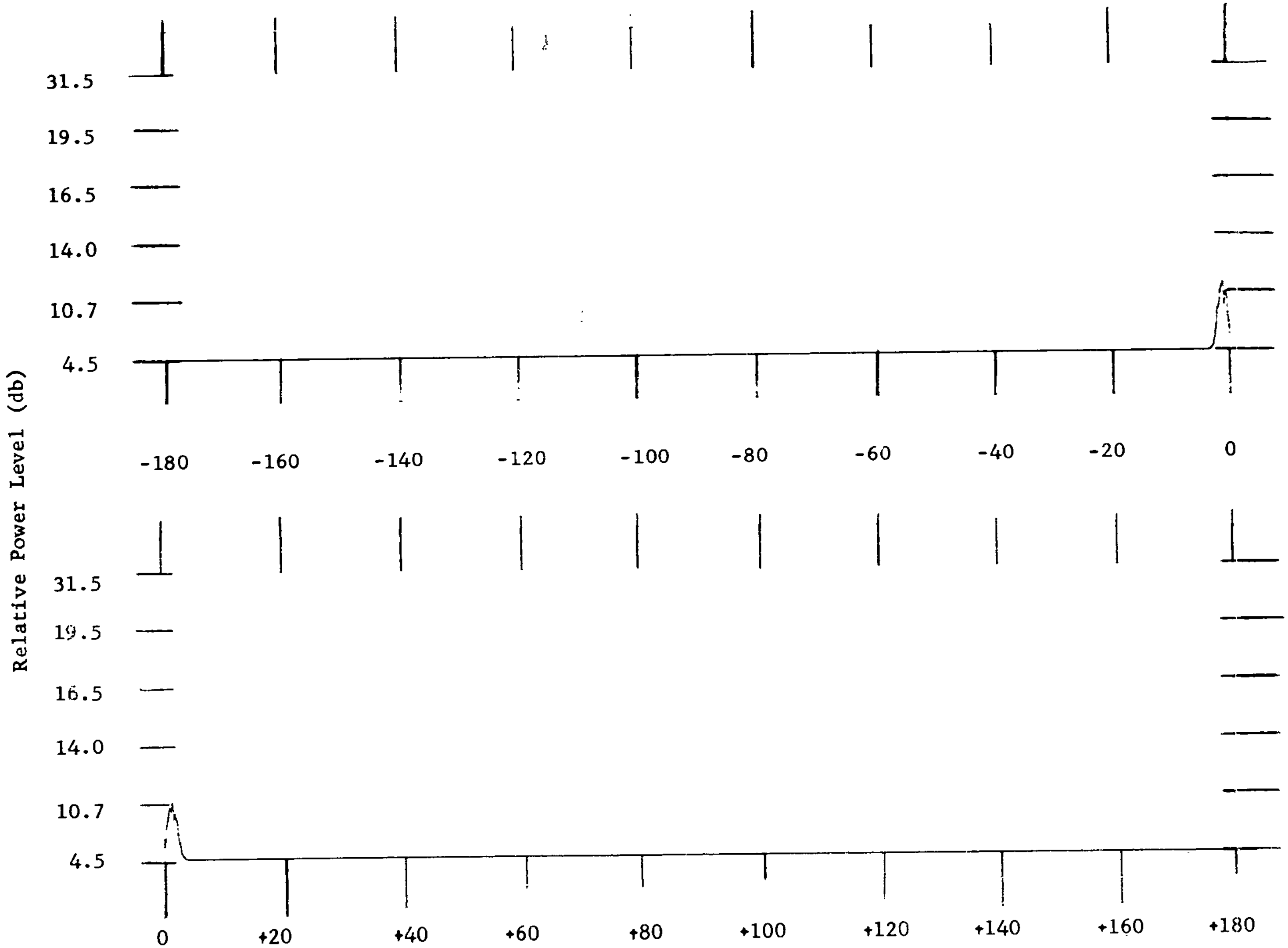


Figure 3.4.14 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1823.8 mc

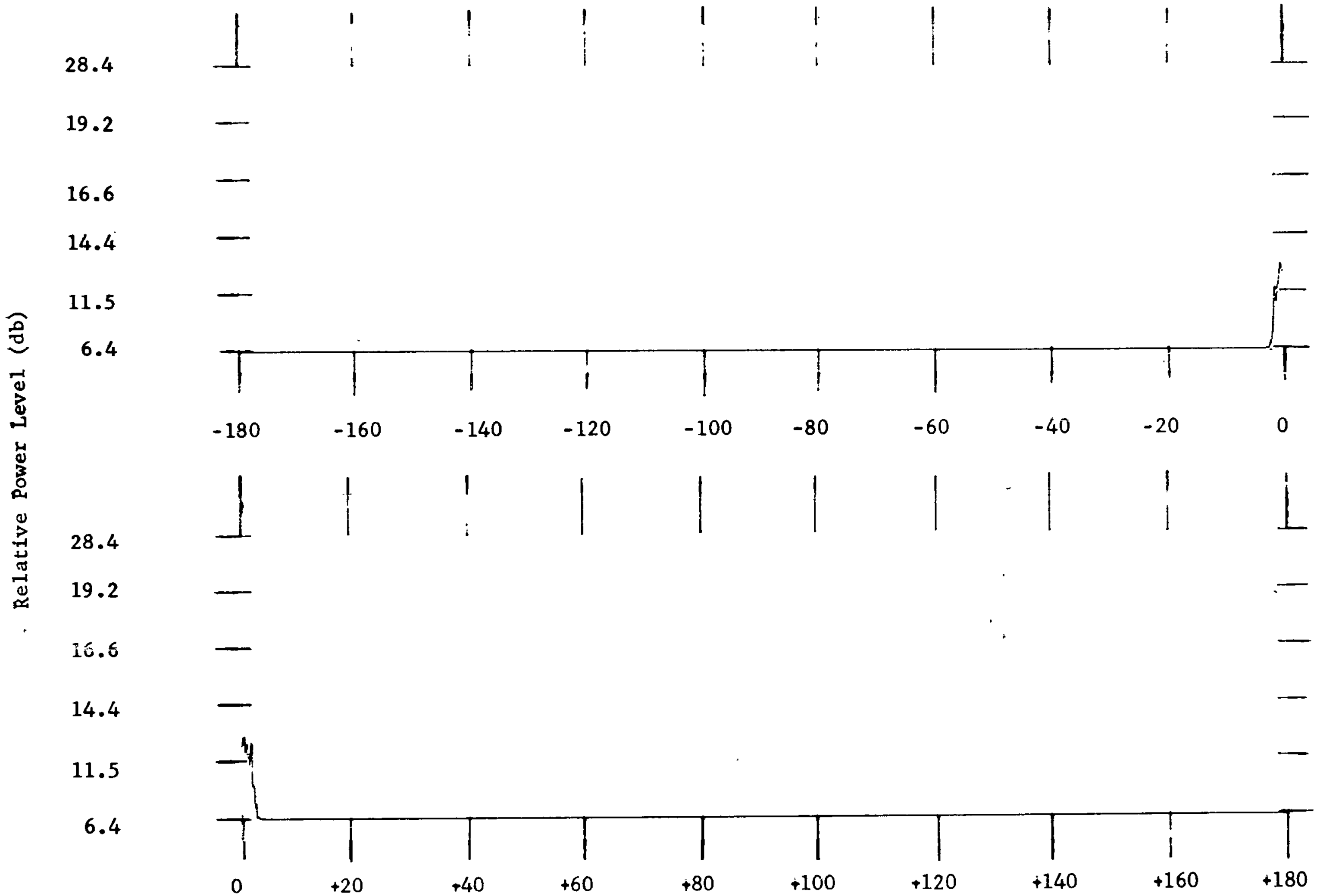


Figure 3.4.15 Antenna Pattern -Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 1968.8 mc

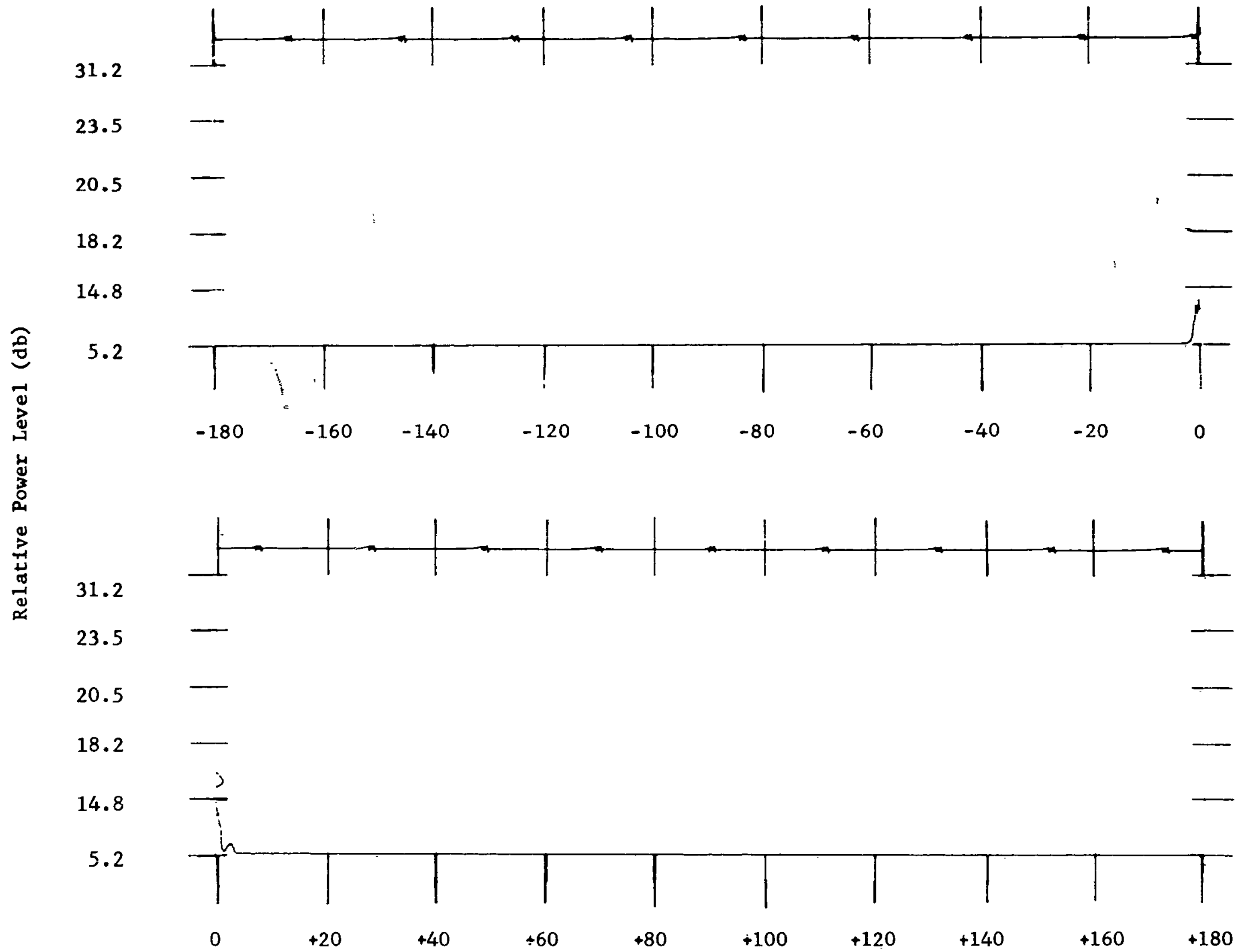


Figure 3.4.16 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2493.5

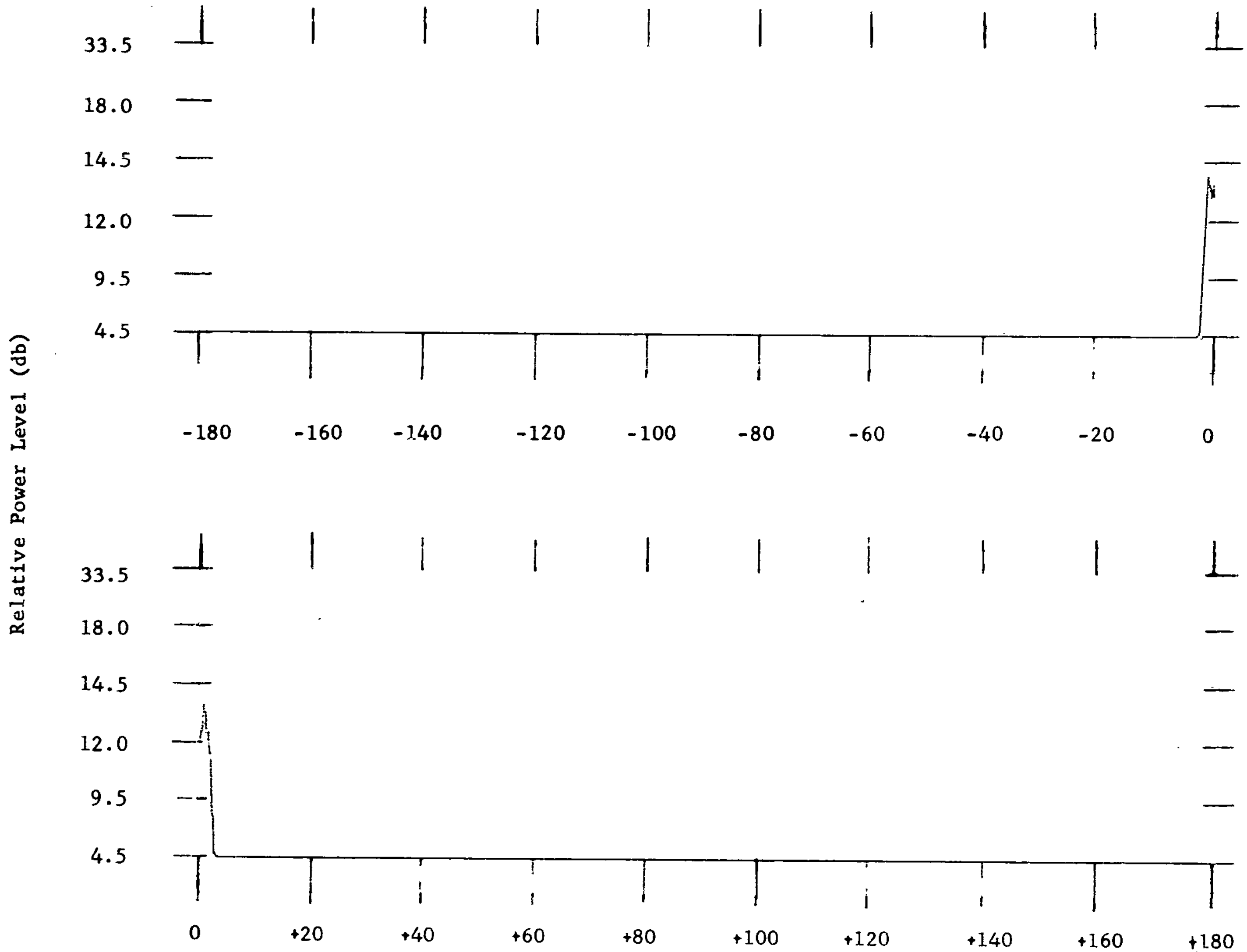


Figure 3.4.17 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2214.1 mc

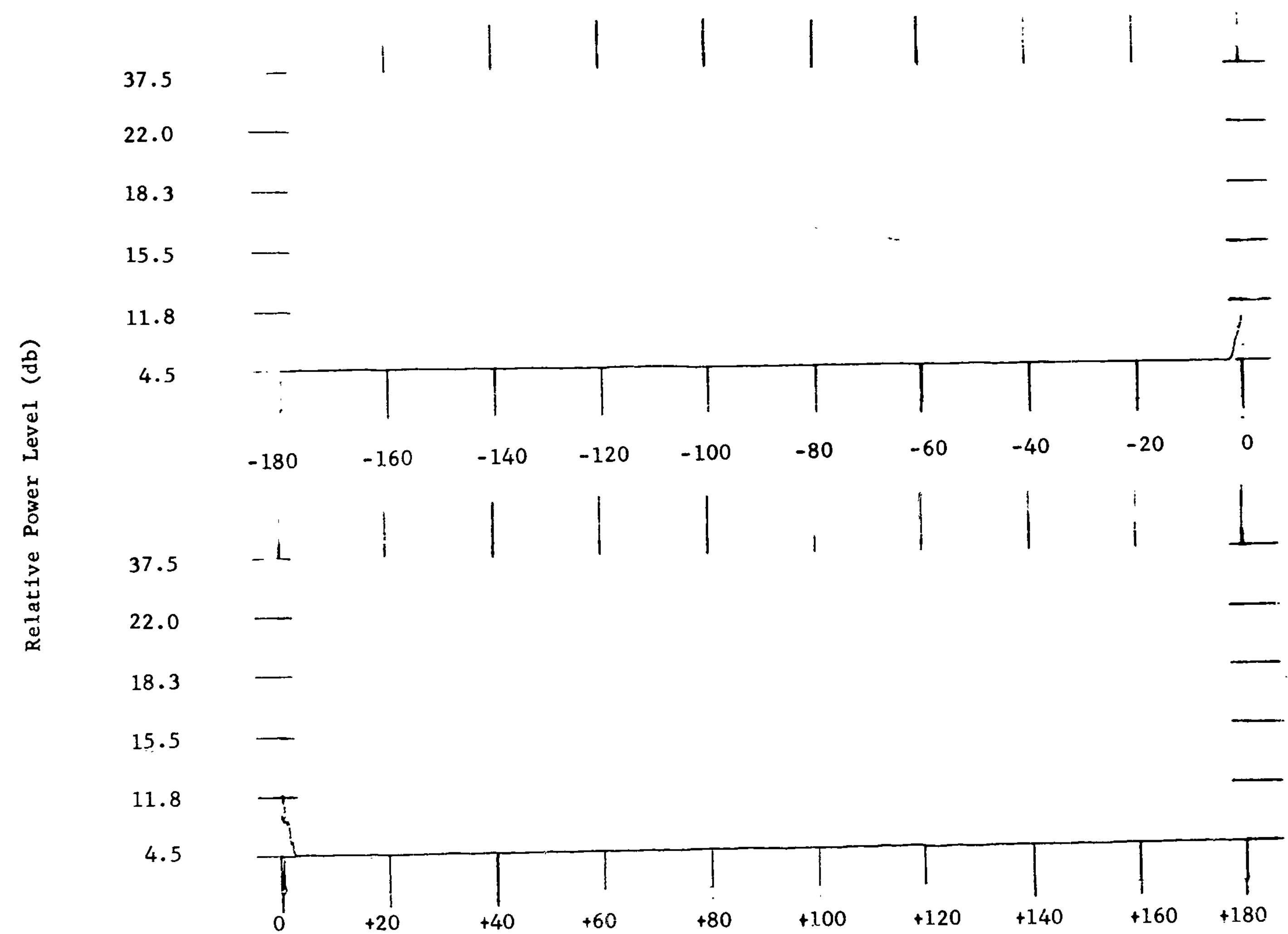


Figure 3.4.18 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2214.1 mc

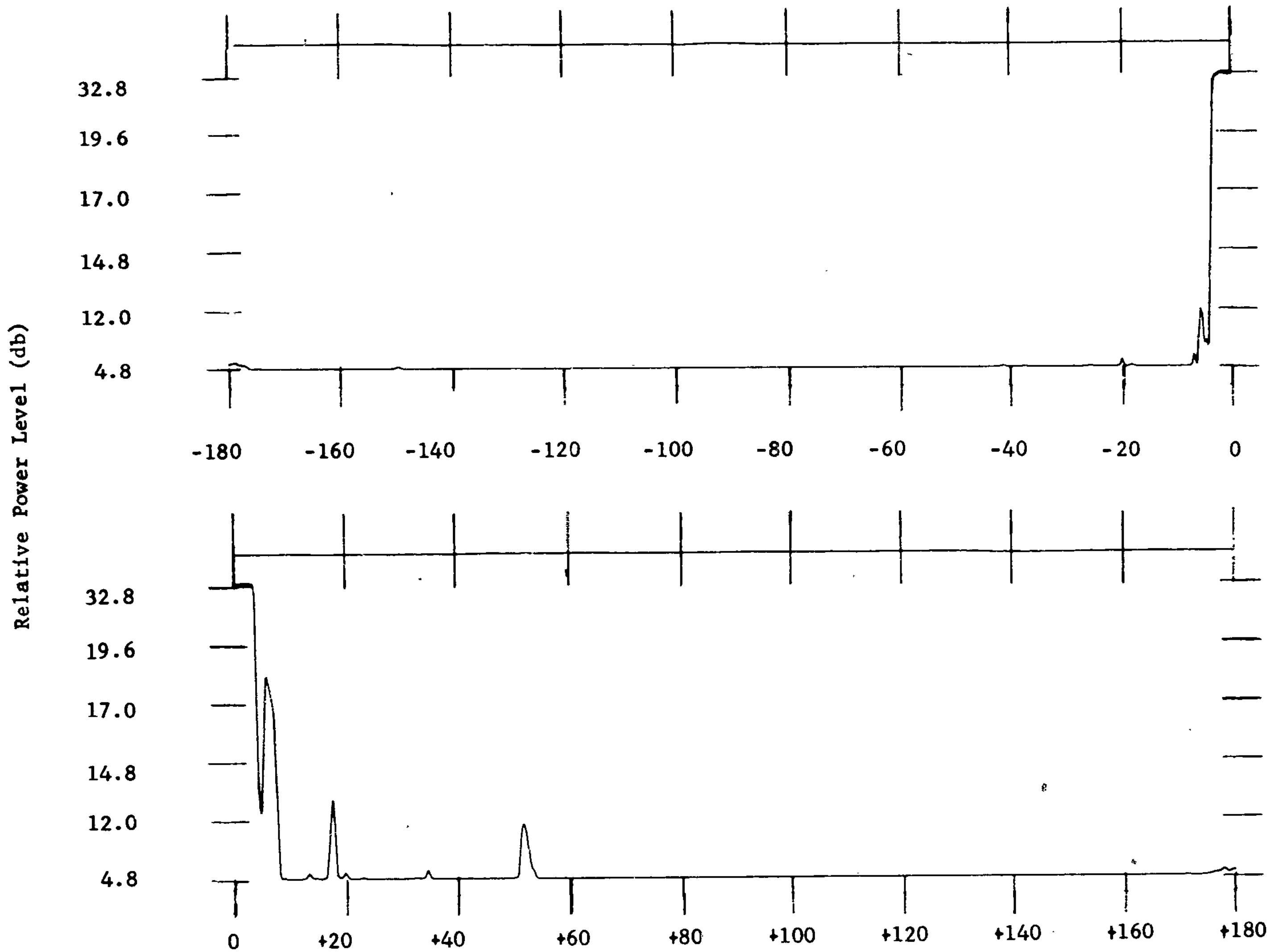


Figure 3.4.19.A Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2634.9 mc
Second Harmonic

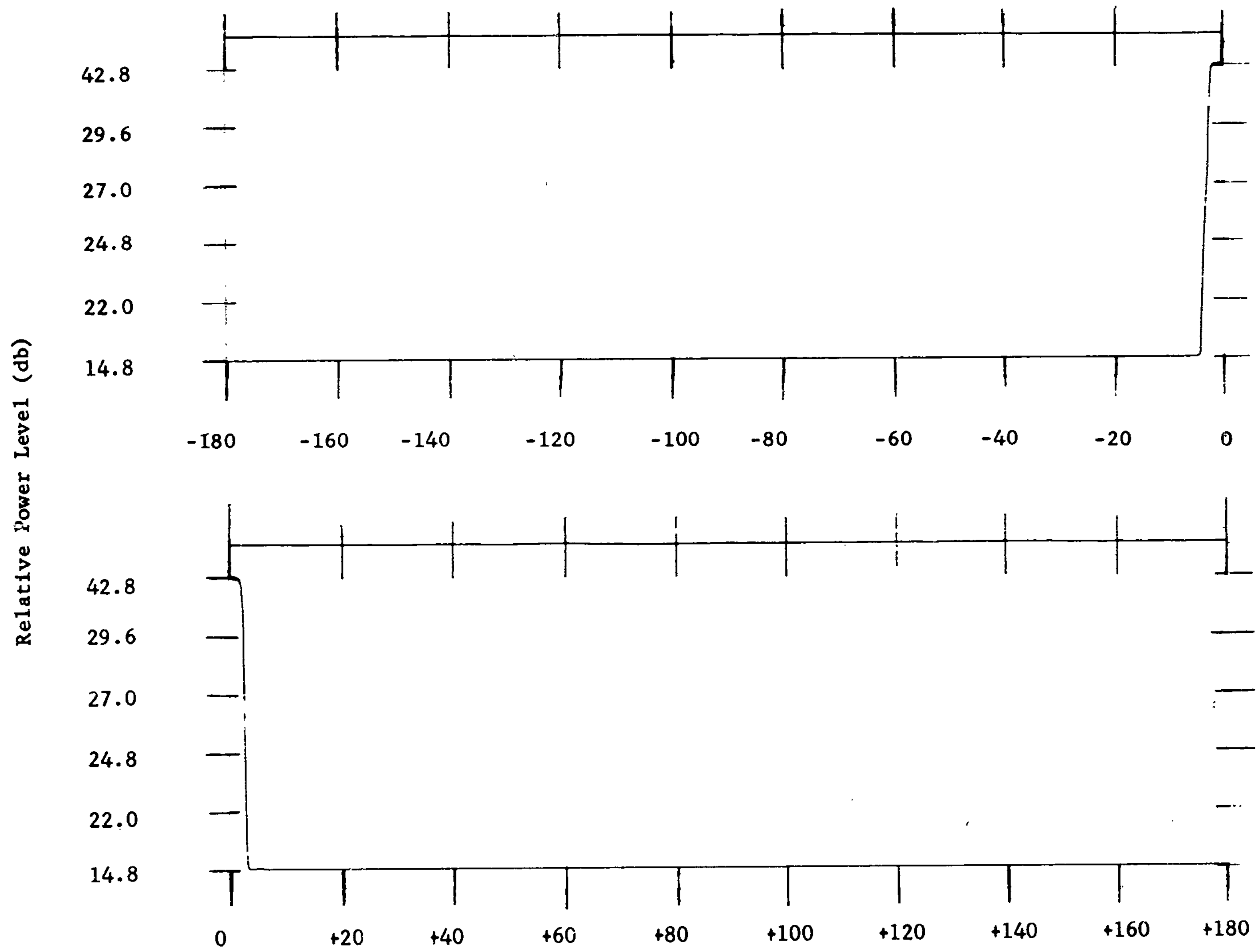


Figure 3.4.19.B Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2634.9 mc
Second Harmonic

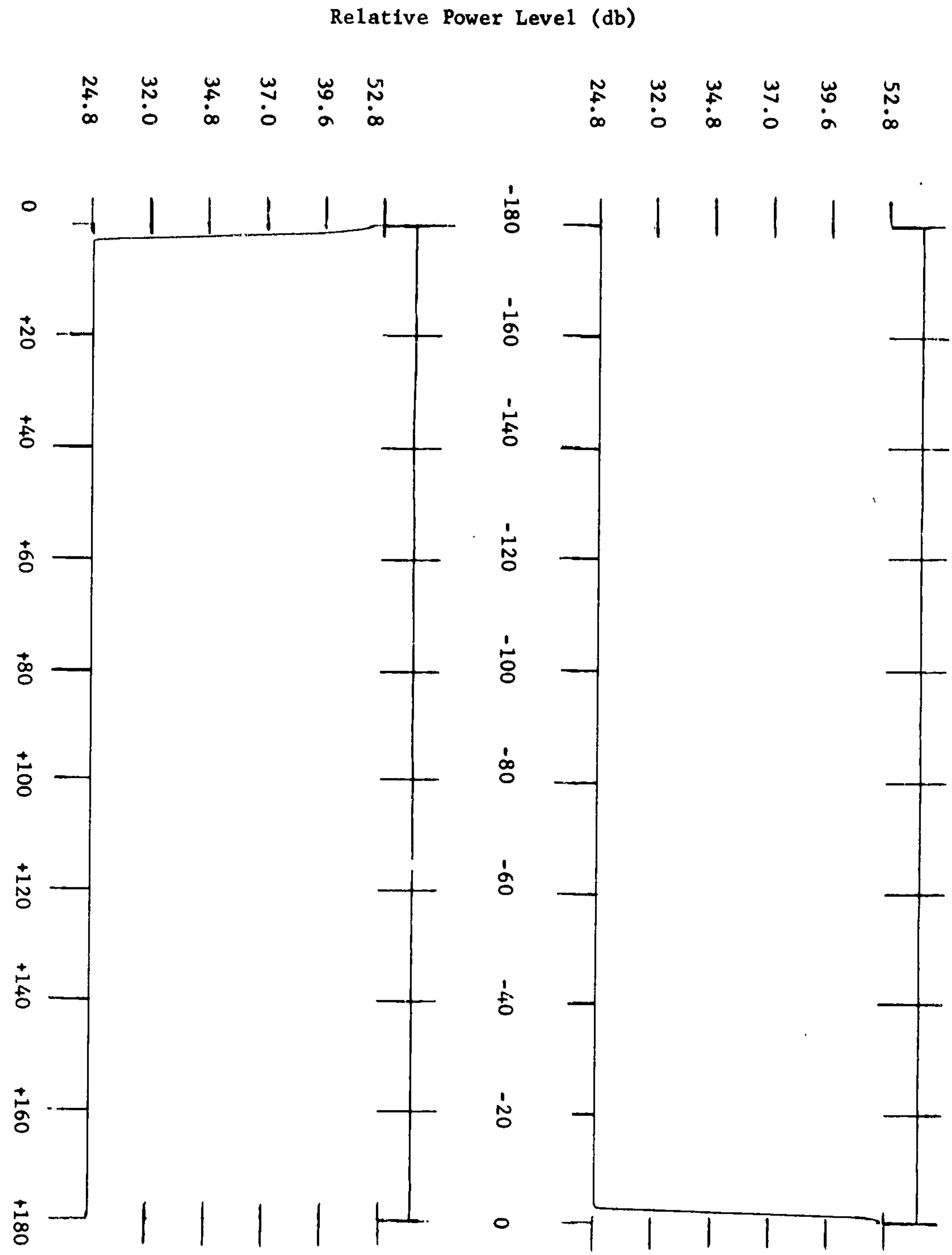


Figure 3.4.19.C Antenna Pattern -Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2634.9 mc
Second Harmonic

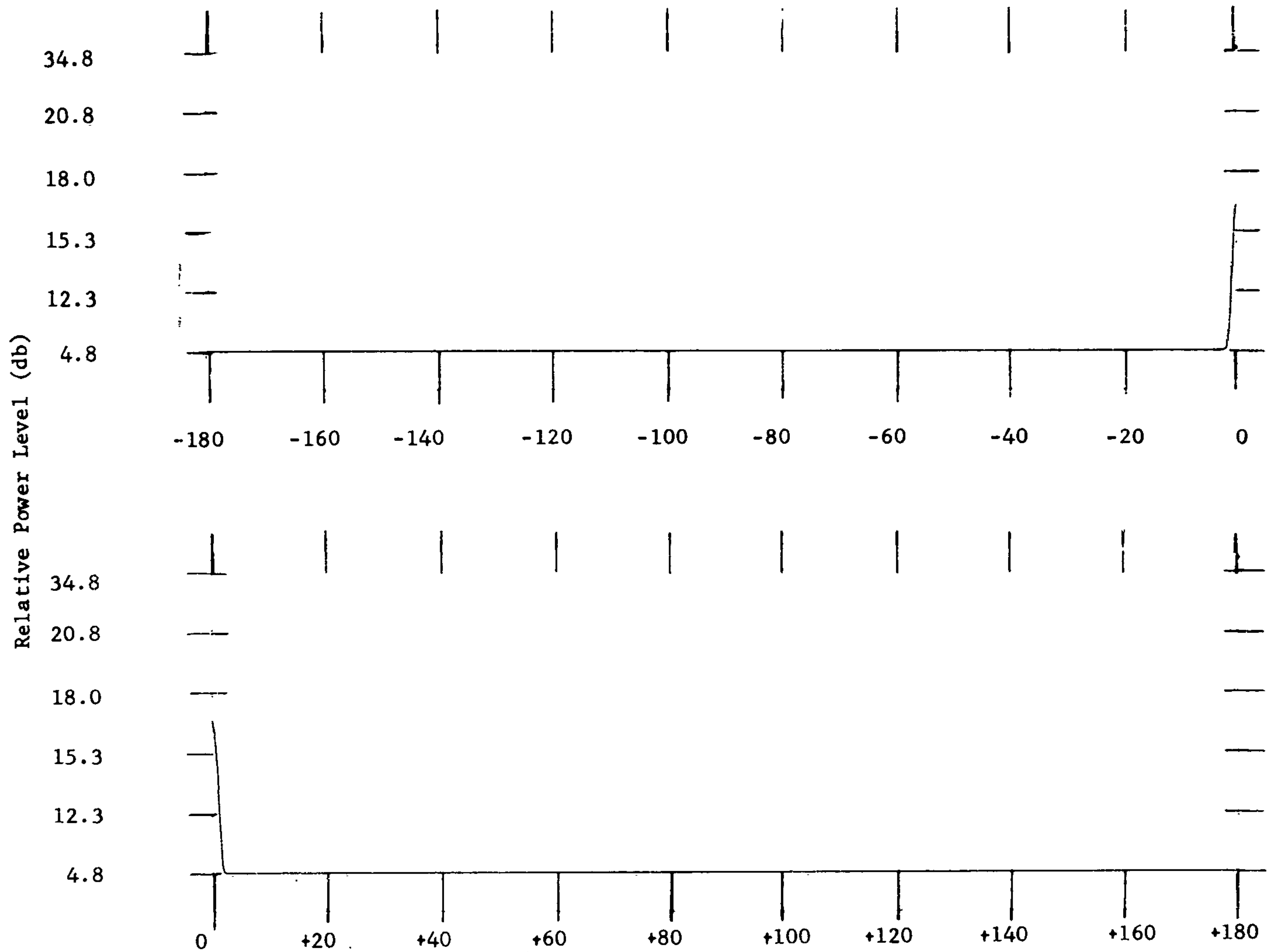


Figure 3.4.20 Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 2634.9 mc
Second Harmonic

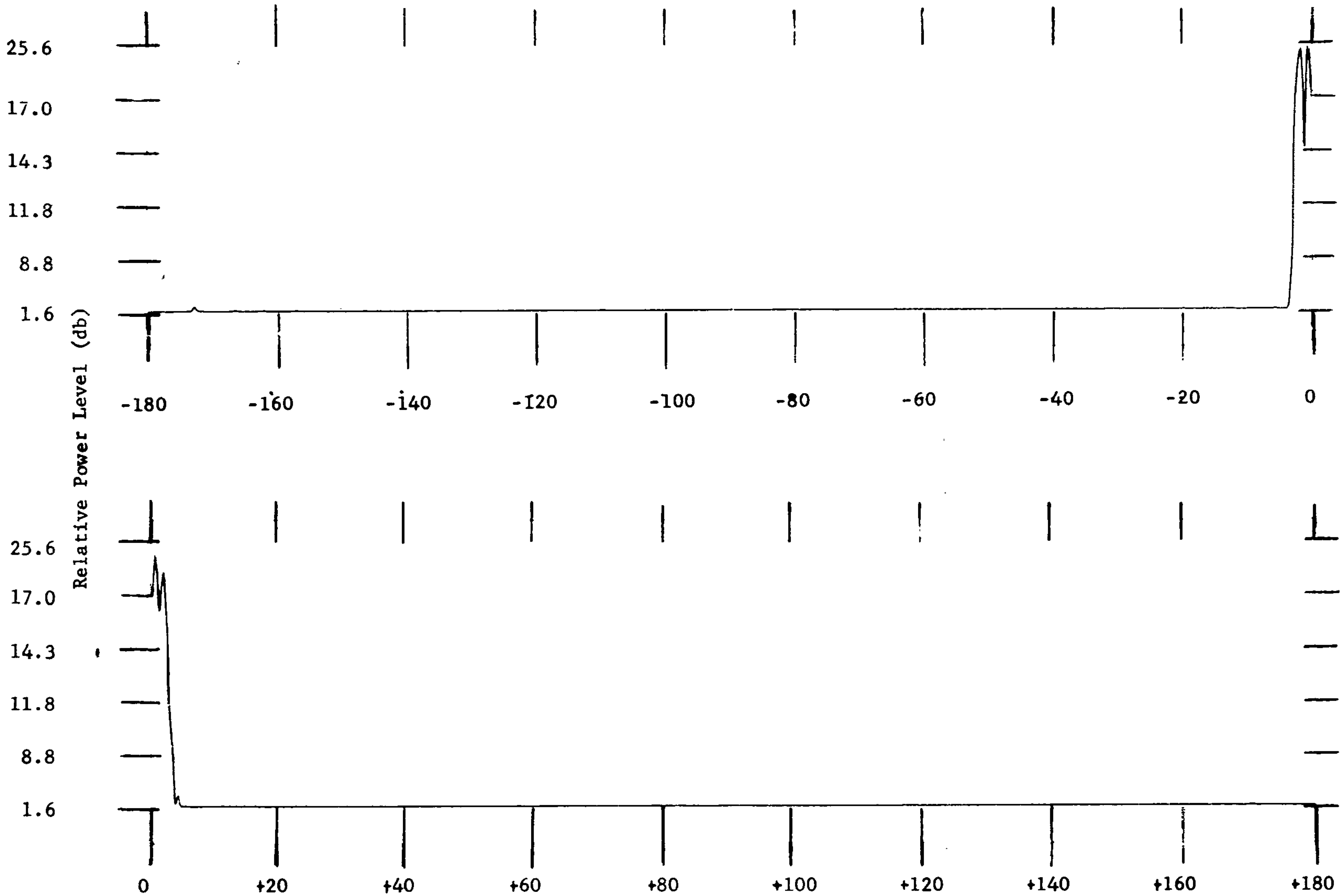


Figure 3.4.21 Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 6670.0 mc
Fifth Harmonic

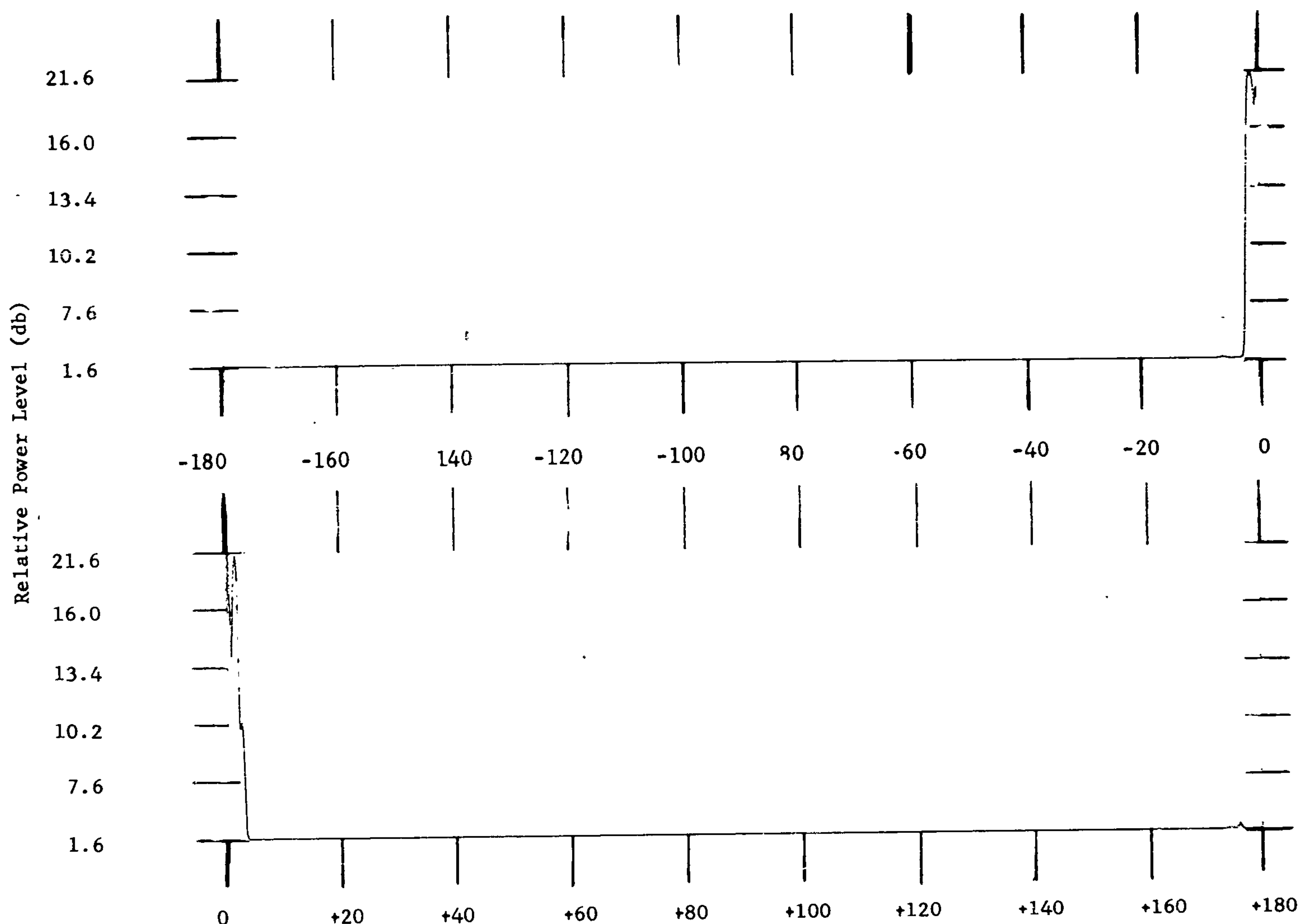


Figure 3.4.22.A Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 6670.0 mc
Fifth Harmonic

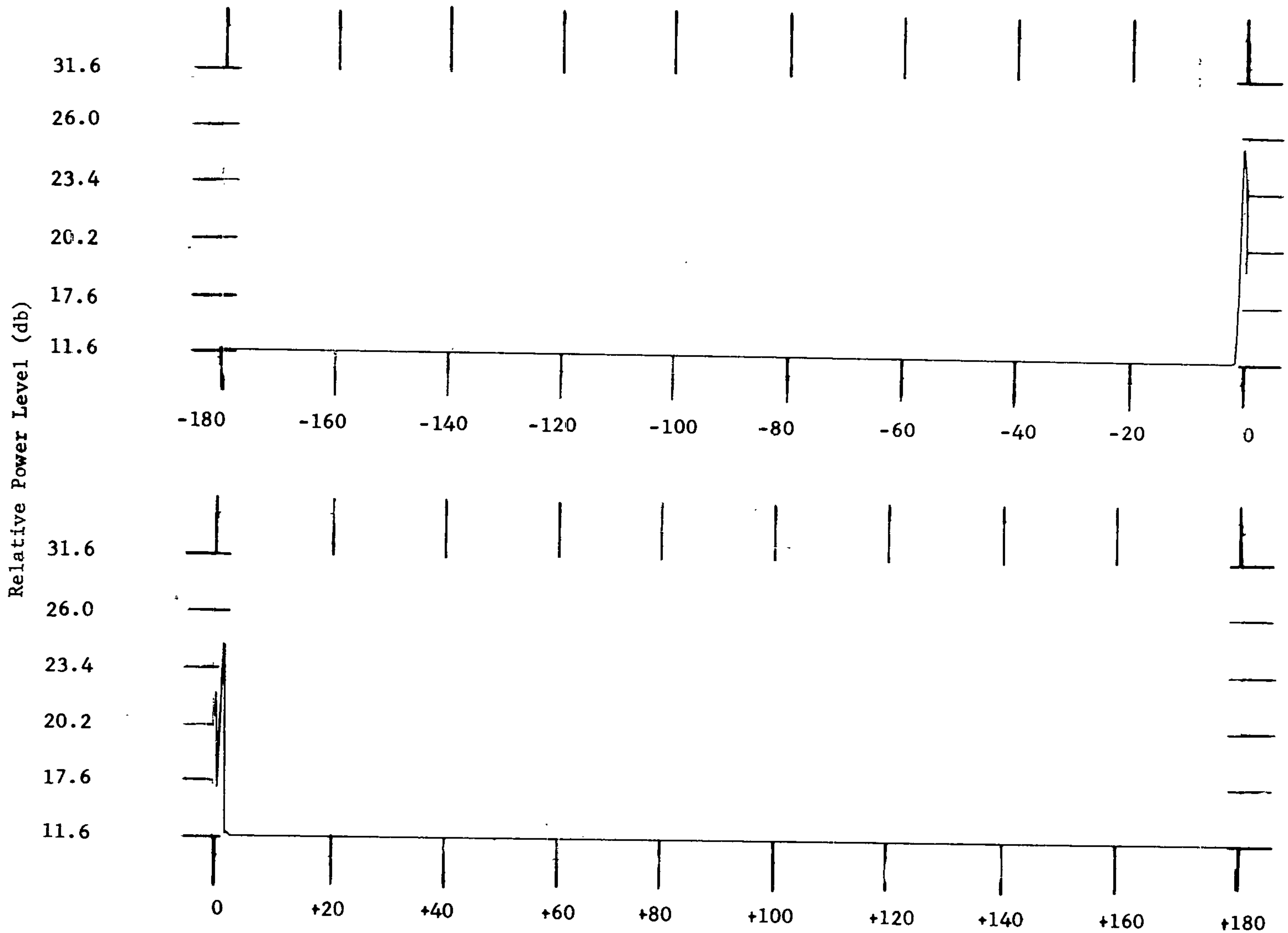


Figure 3.4.22.B Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 6670.0 mc
Fifth Harmonic

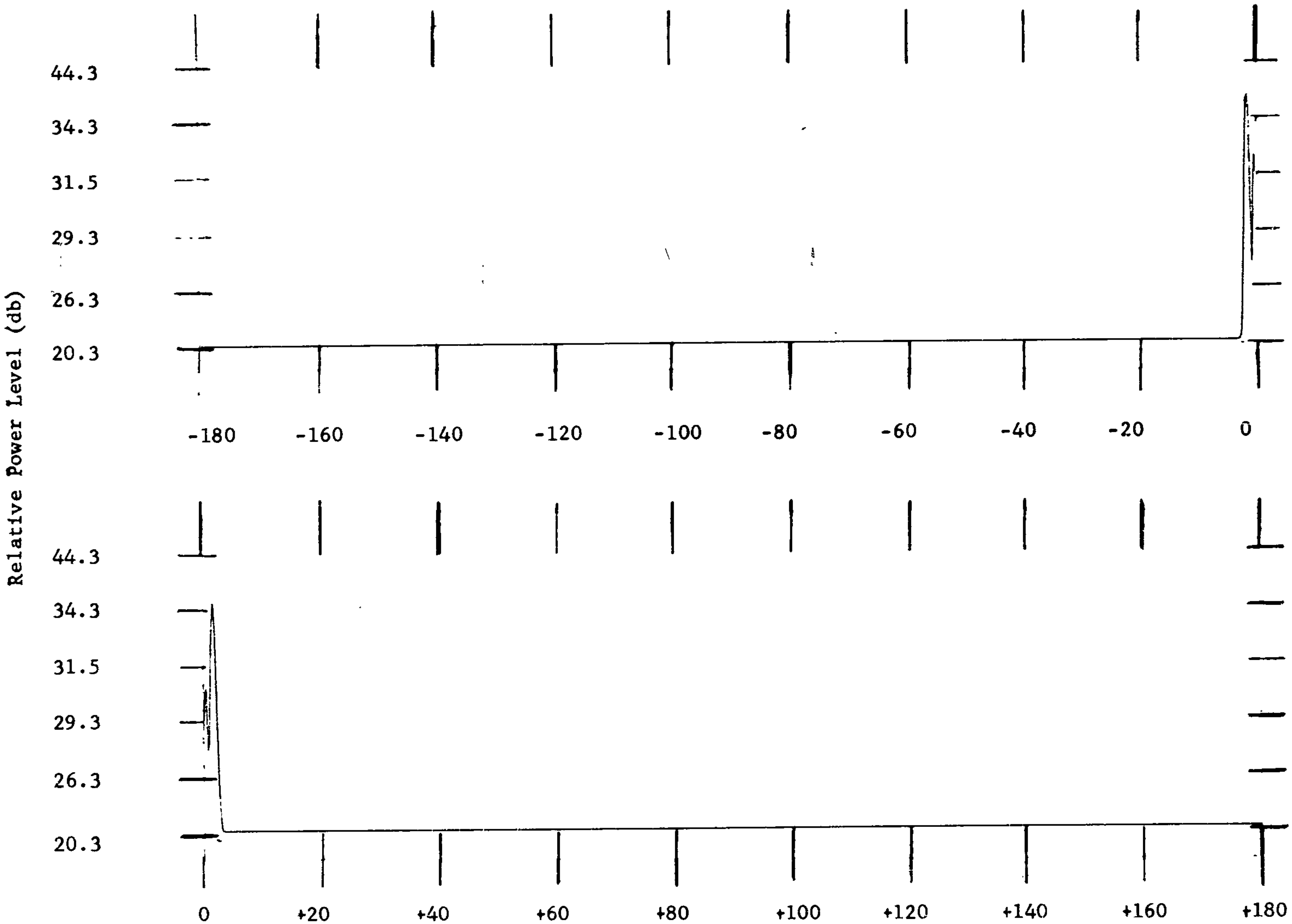


Figure 3.4.23.A Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 5264.4 mc
Fourth Harmonic

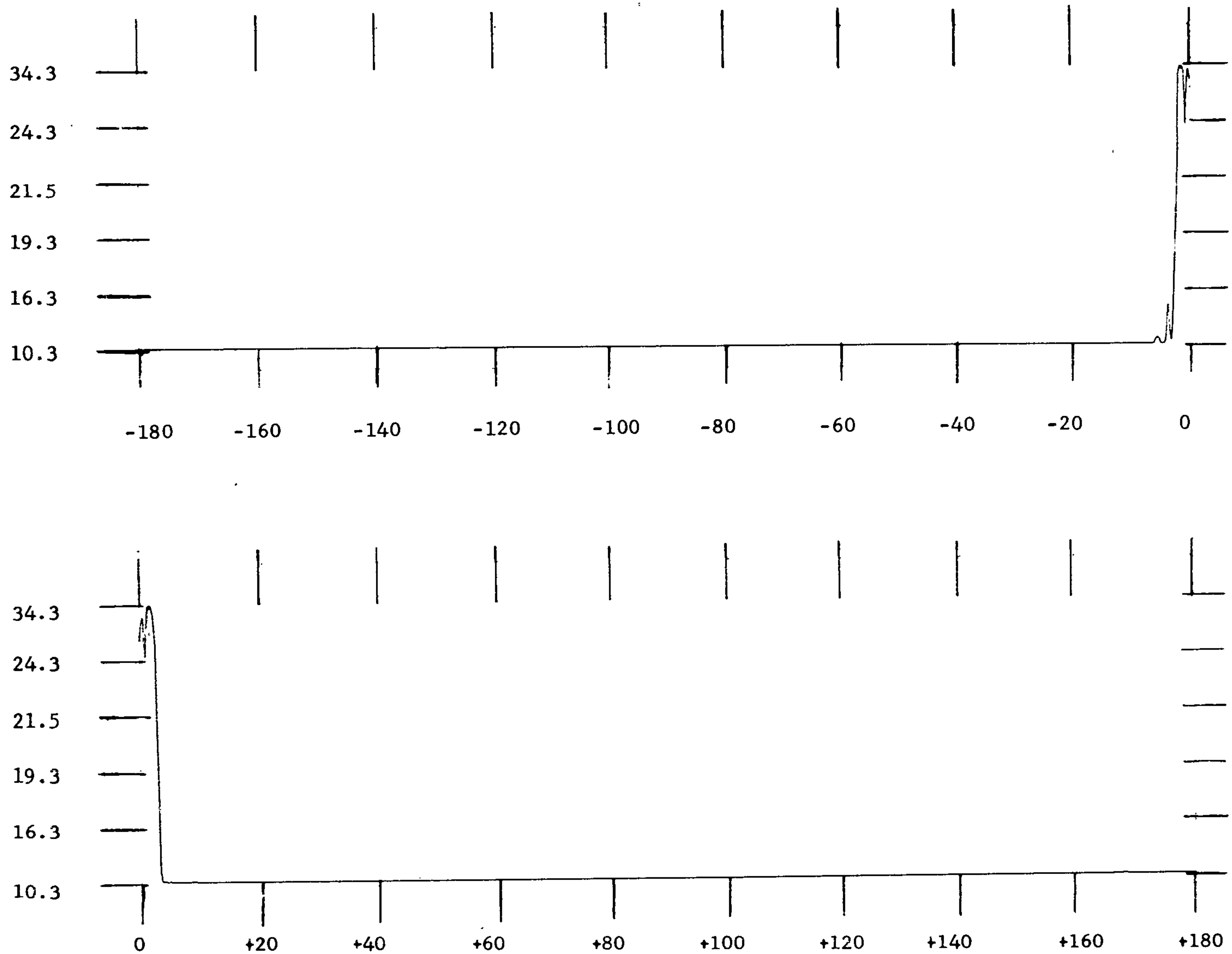


Figure 3.4.23.B Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 5264.4 mc
Fourth Harmonic

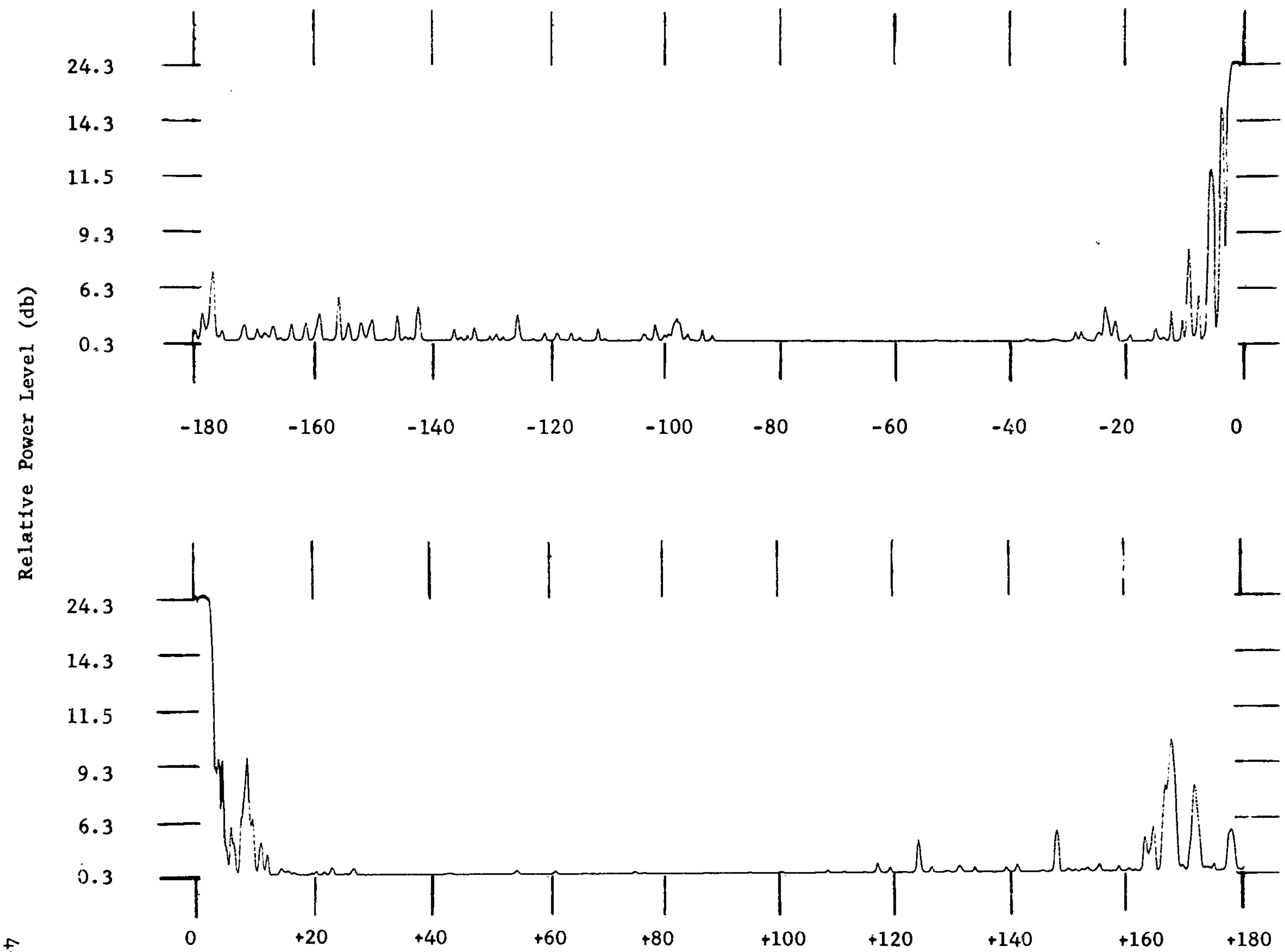


Figure 3.4.23.C Antenna Pattern - Horizontal Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 5264.4 mc
Fourth Harmonic

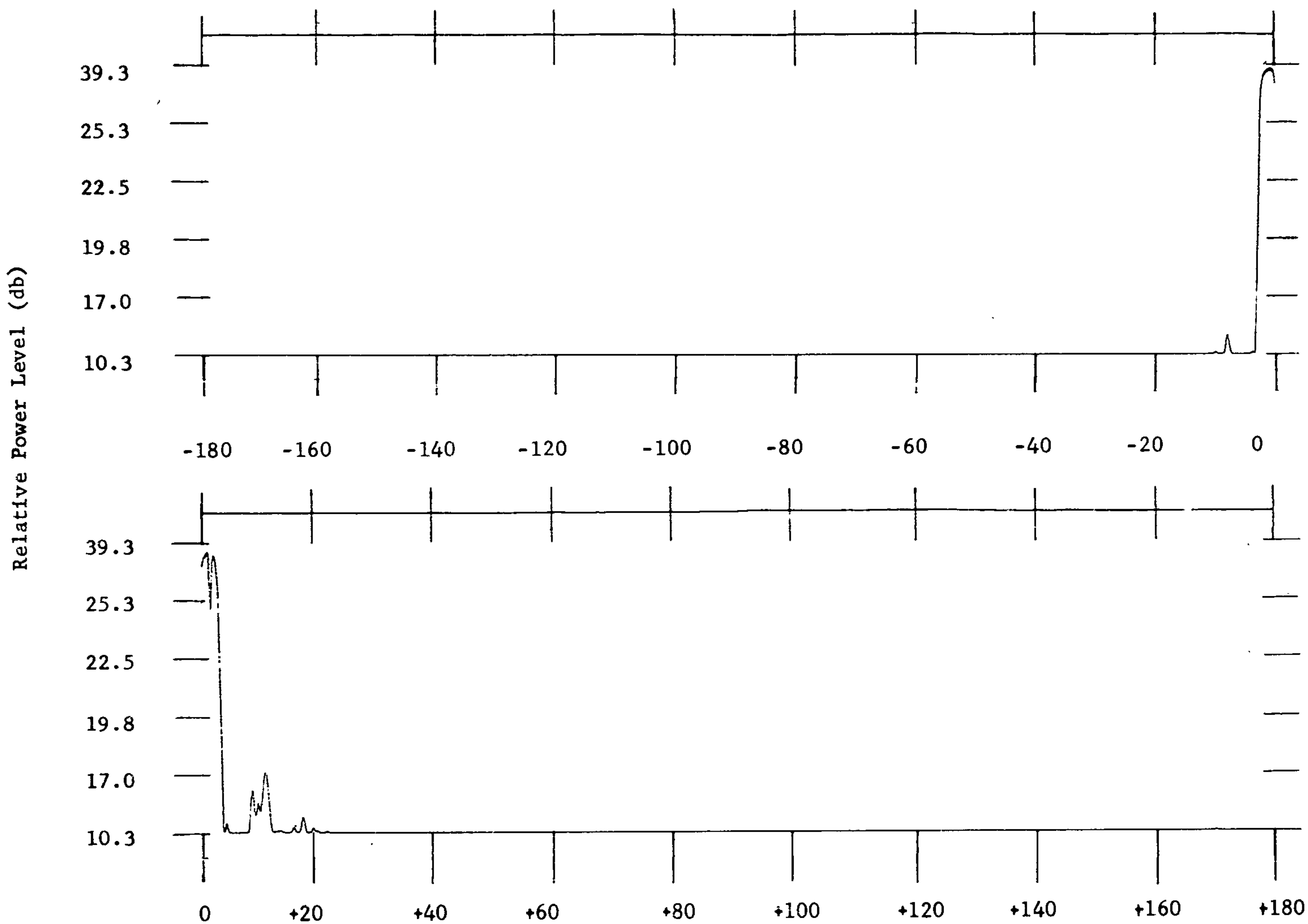


Figure 3.4.24.A Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 5264.4 mc
Fourth Harmonic

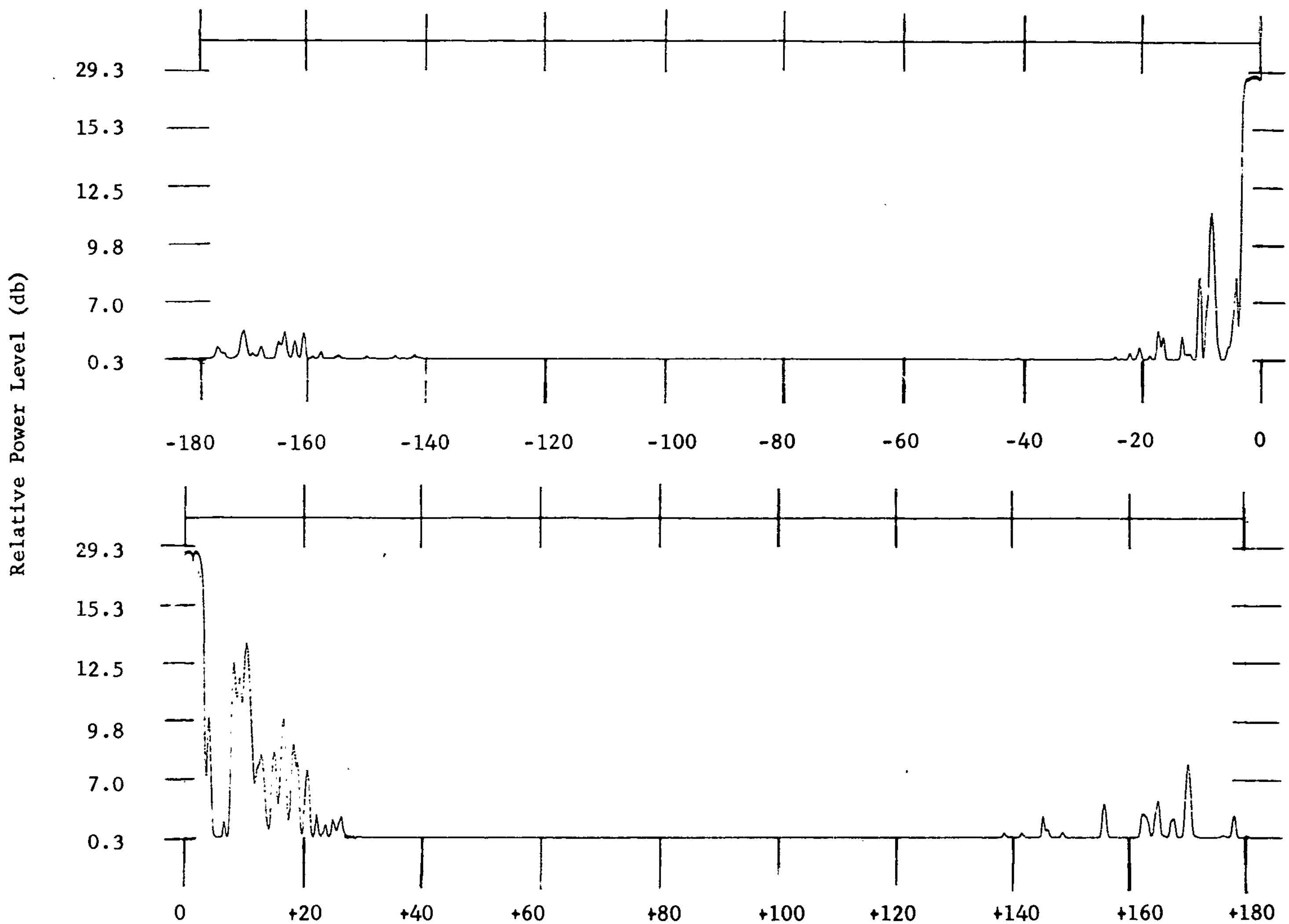


Figure 3.4.24.B Antenna Pattern - Vertical Polarization
Fundamental Frequency 1316.1 mc
Spurious Frequency 5264.4 mc
Fourth Harmonic

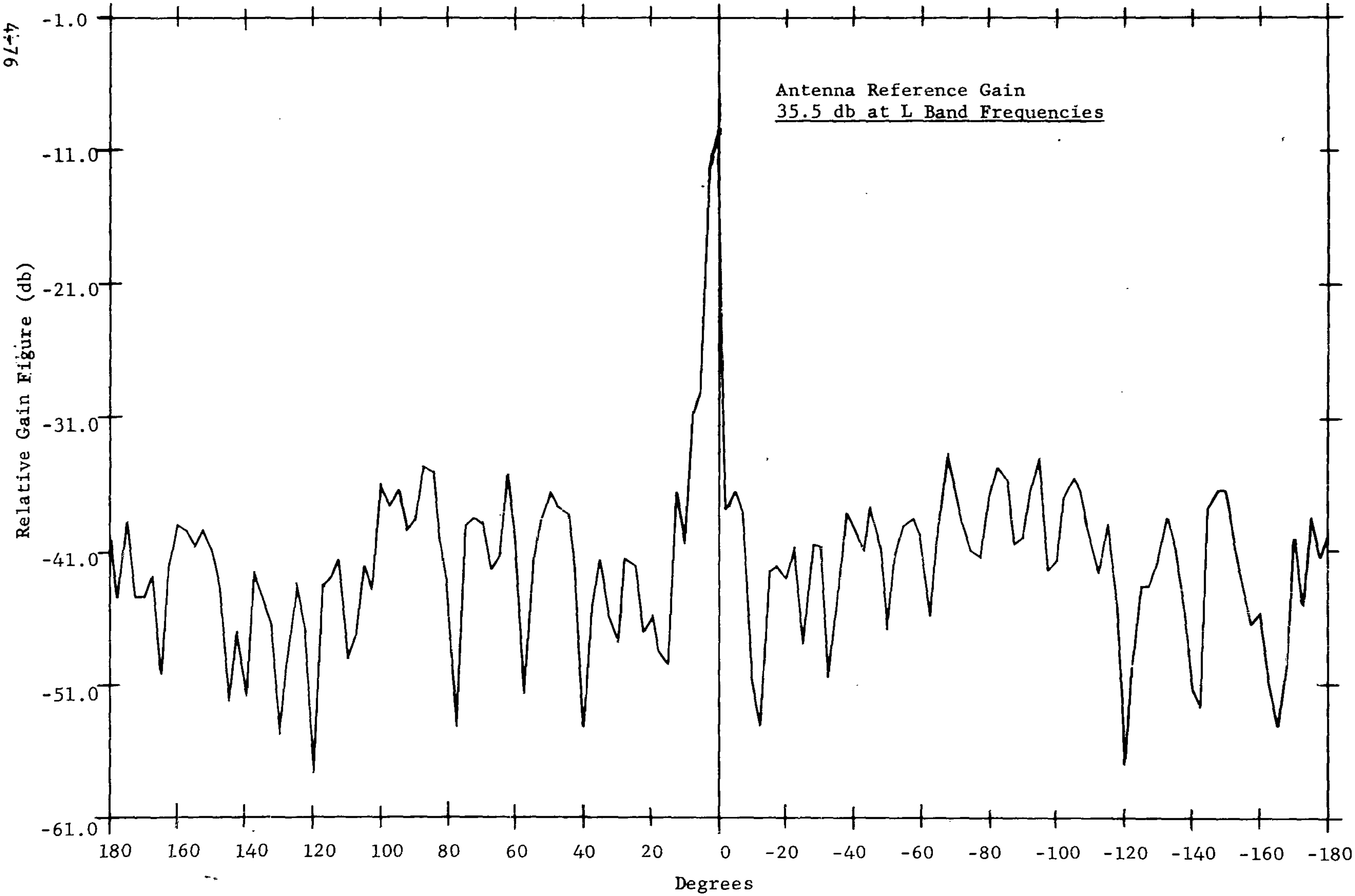


Figure 3.4.25 Specific Antenna Pattern (1000 mc)

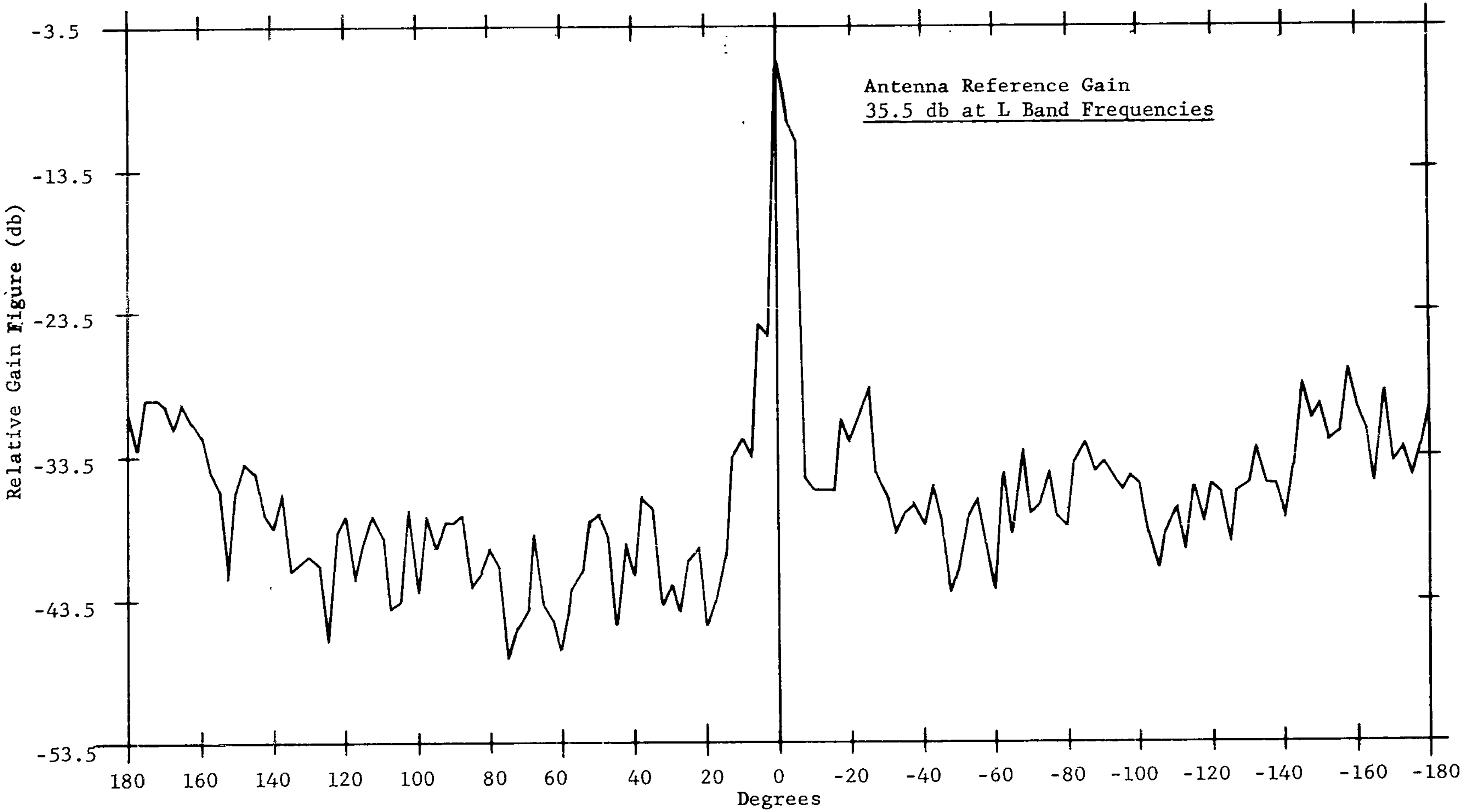


Figure 3.4.26 Specific Antenna Pattern (3500 mc)

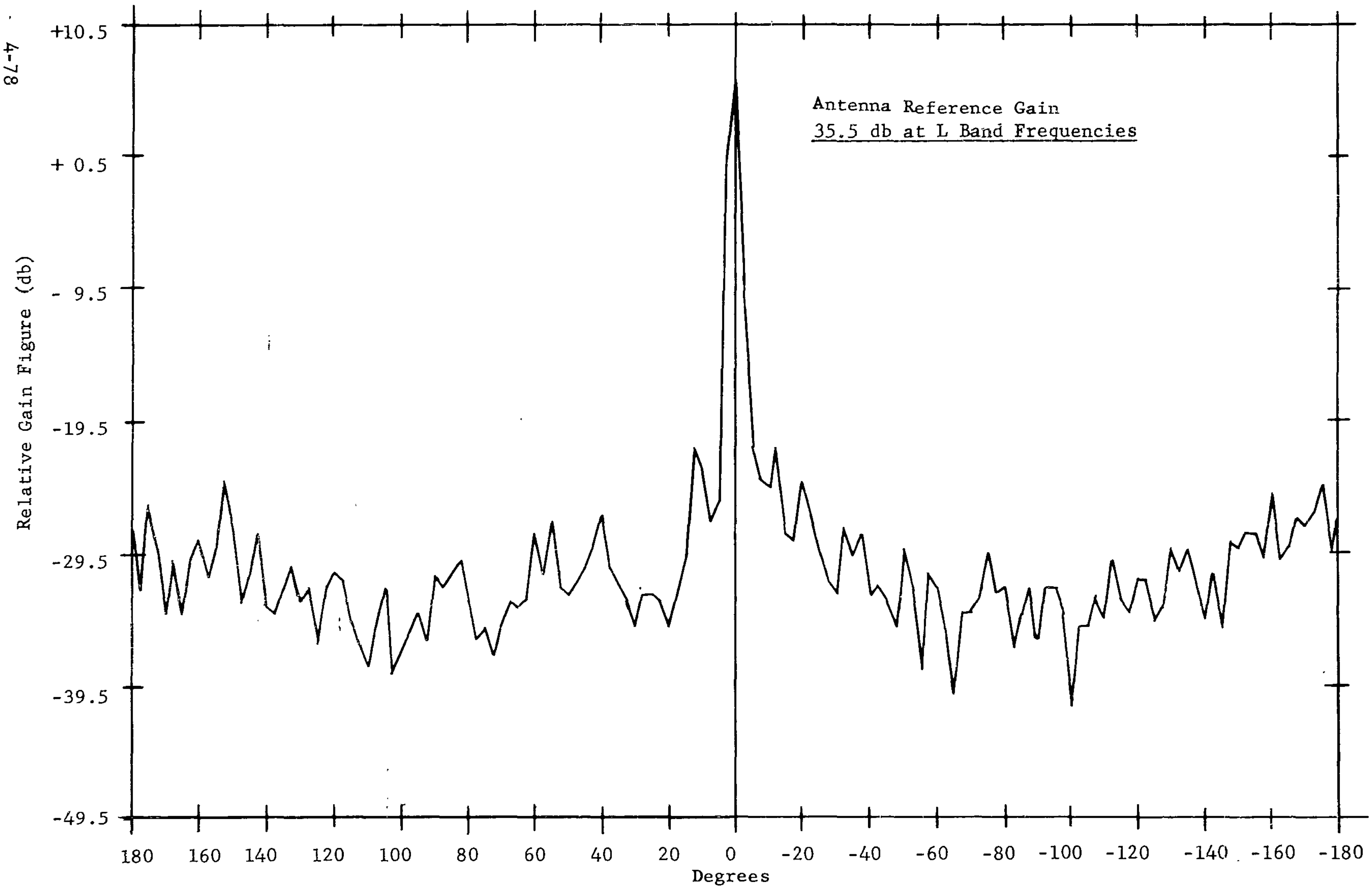


Figure 3.4.27 Specific Antenna Pattern (4000 mc)

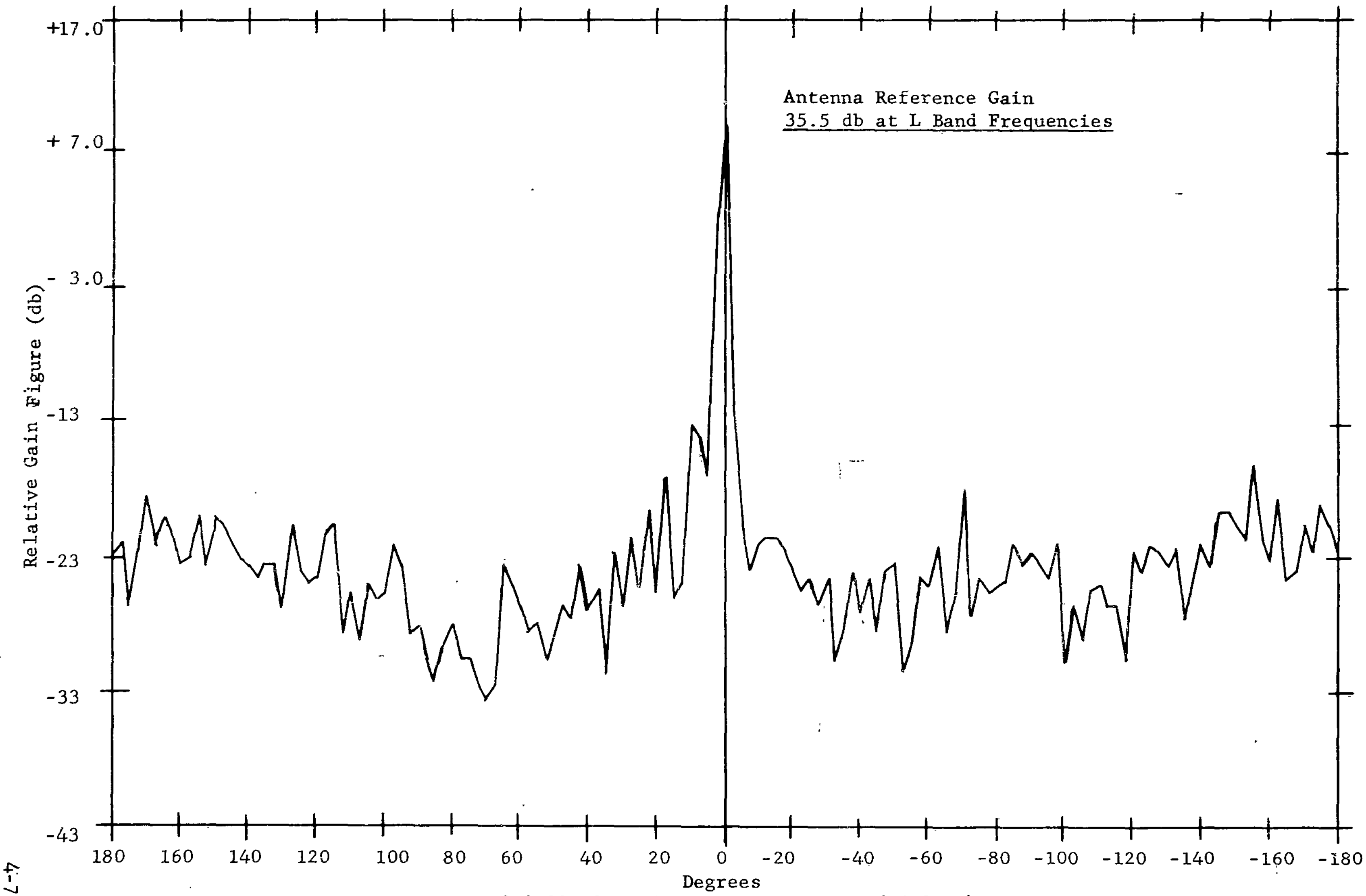


Figure 3.4.28 Specific Antenna Pattern (5650 mc)

Rome Air Development Center, Griffiss AF Base, N.Y.
Rpt No. RADC-TDR-62-512. SPECTRUM SIGNATURE OF RADAR SET AN/FPS-8. Final Report, 27 March 1963
251 p. illus., tables.

Unclassified Report

This report is made up of three sections, the collection of data of the radar transmitter, receiver and antenna to be used as an input to the DOD Analysis Center, Spectrum Signatures Library. The task outlined in this report has been performed and data submitted in accordance with the requirements outlined in DODMCPSS, (Revised 1 Sept. 1961)

1. Transmitter Measurements
2. Receiver Measurements
3. Antenna Patterns

I. AFSC Project 4557
   Task 455701
II. Contract
   AF30(602)-2536
   Order No. 3
III. Bendix F. E. Corp.
   Task 77314-05
IV. In ASTIA collection

Rome Air Development Center, Griffiss AF Base, N.Y.
Rpt No. RADC-TDR-62-512. SPECTRUM SIGNATURE OF RADAR SET AN/FPS-8. Final Report, 27 March 1963
251 p. illus., tables.

Unclassified Report

This report is made up of three sections, the collection of data of the radar transmitter, receiver and antenna to be used as an input to the DOD Analysis Center, Spectrum Signatures Library. The task outlined in this report has been performed and data submitted in accordance with the requirements outlined in DODMCPSS, (Revised 1 Sept. 1961)

1. Transmitter Measurements
2. Receiver Measurements
3. Antenna Patterns

I. AFSC Project 4557
   Task 455701
II. Contract
   AF30(602)-2536
   Order No. 3
III. Bendix F. E. Corp.
   Task 77314-05
IV. In ASTIA collection

Rome Air Development Center, Griffiss AF Base, N.Y.
Rpt No. RADC-TDR-62-512. SPECTRUM SIGNATURE OF RADAR SET AN/FPS-8. Final Report, 27 March 1963
251 p. illus., tables.

Unclassified Report

This report is made up of three sections, the collection of data of the radar transmitter, receiver and antenna to be used as an input to the DOD Analysis Center, Spectrum Signatures Library. The task outlined in this report has been performed and data submitted in accordance with the requirements outlined in DODMCPSS, (Revised 1 Sept. 1961)

1. Transmitter Measurements
2. Receiver Measurements
3. Antenna Patterns

I. AFSC Project 4557
   Task 455701
II. Contract
   AF30(602)-2536
   Order No. 3
III. Bendix F. E. Corp.
   Task 77314-05
IV. In ASTIA collection

Rome Air Development Center, Griffiss AF Base, N.Y.
Rpt No. RADC-TDR-62-512. SPECTRUM SIGNATURE OF RADAR SET AN/FPS-8. Final Report, 27 March 1963
251 p. illus., tables.

Unclassified Report

This report is made up of three sections, the collection of data of the radar transmitter, receiver and antenna to be used as an input to the DOD Analysis Center, Spectrum Signatures Library. The task outlined in this report has been performed and data submitted in accordance with the requirements outlined in DODMCPSS, (Revised 1 Sept. 1961)

1. Transmitter Measurements
2. Receiver Measurements
3. Antenna Patterns

I. AFSC Project 4557
   Task 455701
II. Contract
   AF30(602)-2536
   Order No. 3
III. Bendix F. E. Corp.
   Task 77314-05
IV. In ASTIA collection